此相对应。

如果进行分送允许或者不允许的设定，则投影机控制程序 33 在步骤 S240 中使通信控制单元 32 监视网络 I／F31，接收显示演示画面的图像数据，暂时存储在未图示的 RAM 内。即，把所接收的各个数据包进行结合取得图像数据，存储在 RAM 中。在步骤 S245 中把该接收的图像数据传送到投影控制单元 34，使得投影演示图像。即，投影控制单元 34 处理暂时存储的图像数据，根据需要进行适宜压缩处理或者加密处理的展开等，生成在投影单元 35 中能够显示图像的数据，投影图像。

在步骤 S250 中，从在上述步骤 S230、S235 中设定的内容判别是否设定了分送允许。当在该步骤 S250 中判别为设定了分送允许时，在步骤 S255 中经过通信控制单元 32 监视网络 I／F31，判别从用户 PC40 的哪一个发送了表示连接请求的数据包。在步骤 S255 中判别为从用户 PC40 的某一个发送了表示连接请求的数据包时，在步骤 S260 中对于进行了连接请求的用户 PC40 进行连接允许。即，使通信控制单元 32 经过网络 I／F31 发送表示连接允许的数据包。

接着，在步骤 S265 中，对于进行了上述连接允许的用户 PC40 分送暂时存储在上述 RAM 内的图像数据。即，通信控制单元 32 把该图像数据分割在适当的数据包中，把以连接允许完毕的用户 PC40 为发送目标的数据写入到标题中等，经过网络 I／F31 发送这些数据包。这里，由于分送的图像数据与存储在上述 RAM 内的数据相同，因此能够在由投影控制单元 34 进行的处理之前的状态下直接发送数据。从而，如果是进行了上述压缩处理的数据，则能够在抑制网络负荷的状态下发送。

在进行了步骤 S265 中的图像数据分送的情况下，或者当在步骤 S255 中判别为没有从用户 PC40 的某一个发送出表示连接请求的数据包时，在步骤 S270 中判别是否结束了上述演示。即，使通信控制单元 32 监视网络 I／F31，判别是否接收了最终演示画面。在该步骤 S270 中反复进行上述步骤 S240 以后的处理直到判别为结束了上述演示为止。另外，当在上述步骤 S250 中判别为没有设定分送允许时，在步骤 S275 中判别是否结束了上述

演示。如果判定为没有结束演示则在步骤 S275 中也反复执行步骤 S240 以后的处理。

如以上那样，在投影机 30 从演示者 PC20 接收图像数据，实施在屏幕上投影图像的处理的同时，在设定了分送允许的情况下，对于进行了连接请求的用户 PC40 分送图像数据。与用户 PC40 的通信以及图像数据的分送由于通过投影机 30 进行，因此提供给上述演示者 PC20 分送不允许的情况非常少。另外，由于在投影机 30 中发送图像数据时直接对于用户 PC40 发送上述接收的图像数据，因此在图像数据的分送时没有多少图像处理的负荷，能够流畅地进行通信，能够使用户 PC40 没有感觉到压力而视听演示图像。

进而，作为在图像数据的发送中利用的众所周知的技术，有 RGB 线缆或者同轴线缆等，而在根据这些结构进行投影机 30 中的图像投影时，需要由 RGB 线缆等发送图像数据和机器控制用的双向通信线缆这两条线路。而在本实施形态中，由于经过网络发送图像数据，因此作为把演示者 PC20 与投影机 30 以及投影机 30 与用户 PC40 连接在一起的线缆只要构成网络线缆就很充分。从而，能够通过简单的结构构成图像显示系统。

（4）用户 PC 中的处理：

其次根据图 4 所示的流程详细叙述用户 PC40 中的接收控制程序 43 的处理。在本实施形态中用户 PC40 与用户 PC40 进行通信，而与演示者 PC20 不进行通信。在步骤 S300 中，接收控制程序 43 经过通信控制单元 42 对于投影机 30 发送连接请求。即，通信控制单元 42 经过网络 I／F41 发送表示连接请求的数据包。

在步骤 S310 中，判别对于上述连接请求是否进行了连接允许。即，经过通信控制单元 42 监视网络 I／F41，判别上述投影机 30 是否接收了在步骤 S260 中输出的表示连接允许的数据包。当在该步骤 S310 中判别为进行了连接允许时，在步骤 S320 中接收投影机 30 输出的图像数据。即，使通信控制单元 42 监视网络 I／F41，接收表示演示画面的图像数据的数据包，把它们相结合生成图像数据的同时暂时存储在未图示的 RAM 内。

在步骤 S340 中把该接收的图像数据传送到显示控制单元 44，使得在用户 PC40 的画面上显示演示图像。即，显示控制单元 44 处理暂时存储的图像数据，根据需要进行适宜压缩处理或者加密处理的展开等，生成能够在显示单元 45 中显示图像的数据，显示图像。而且，在步骤 S340 中，使通信控制单元 42 监视网络 I／F41，通过判别是否接收了最终的演示画面，反复进行上述步骤 S320 以后的处理，直到判别为结束了演示为止。

另外，当在上述步骤 S310 判别为对于连接请求没有进行连接允许时，跳过步骤 S320 以后的步骤，不进行图像数据的接收。如以上那样，在用户 PC40 中从投影机 30 接收图像数据在画面上显示演示画面。从而，即使由于远离投影机的投影屏幕，或者投影会场过大等原因视听者处于难以视认投影图像的位置，视听者也能够在手头可靠地视听图像。

（5）其它实施形态：

上述实施形态是实现本发明图像显示系统，投影机，图像显示方法，投影机控制方法，图像显示程序以及投影机控制程序的一个例子，当然也能够采用其它的结构。例如，可以采用仅对于处在演示会场内的视听者的用户 PC40 分送图像数据的结构。例如，在上述实施形态中，虽然当在设定了分送允许时对于进行了连接请求的所有用户 PC40 允许连接，分送了图像数据，但是如果根据口令限制连接允许对象，则能够限制分送目标。

用图 3 以及图 4 的虚线包围的记述示出在通过口令实现限制连接允许对象的结构的情况下应该在图 3 以及图 4 中添加的处理，图 5 示出表示该例子中的工作例的概略图。在该例子中，如在图 5 中作为来自投影机 30 的投影图像示出的那样，在投影画面的一部分上显示口令。从而，从演示者 PC20 发送的图像数据是包括用于显示口令的图像的数据，投影机 30 在步骤 S245 的图像投影时显示口令。

在用户 PC40 中，在实施步骤 S300 的连接请求之前通过键盘等操作输入设备输入口令，在步骤 S300 的连接请求时与表示连接请求的数据一起发送表示该输入的口令的数据。在投影机 30 中，在步骤 S260 中实施连接允许之前取得上述输入的表示口令的数据的同时判别该口令是否正确。而且，

当判别为口令正确时进行步骤 S260 的连接允许处理，当判别为口令不正确时进行步骤 S270 的处理。

为了判别口令是否正确能够采用各种结构。例如，预先把表示正确口令的数据存储在投影机 30 的未图示的 RAM 等中，可以把该存储的正确口令与上述输入的口令进行比较，也可以抽取出在上述步骤 S240 中接收的图像数据中所包含的口令的数据，作为正确的口令，除此以外还能够采用各种结构。总之，通过以上的结构，由于在演示会场内能够视听画面的视听者能够输入正确的口令，因此能够把分送目标限定为会场内的用户 PC40。

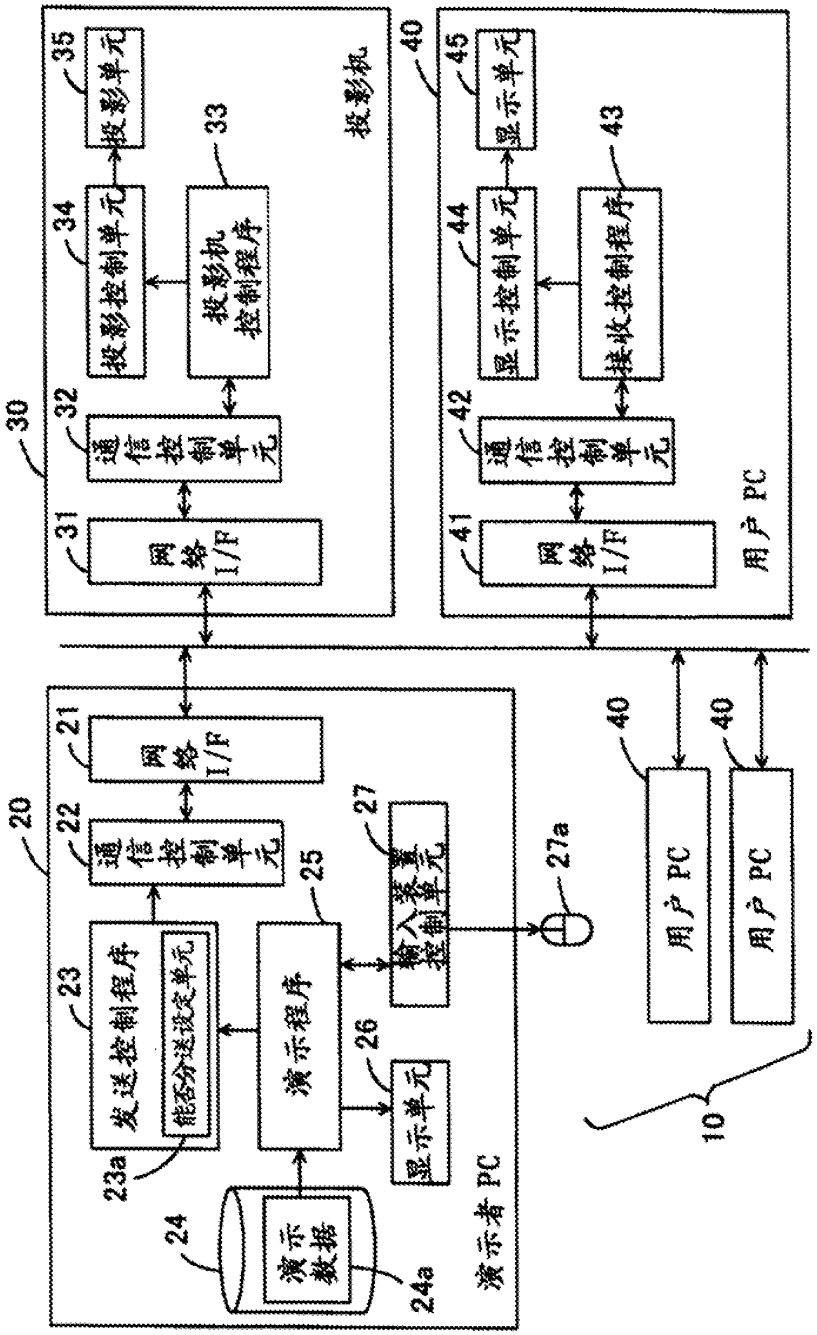

投影机
30
35
投影单元
34
投影控制单元
33
投影机控制程序
32
通信控制单元
31
网络I/F
40
45
显示单元
44
显示控制单元
43
接收控制程序
42
通信控制单元
41
网络I/F
用户 PC
20
21
网络I/F
22
通信控制单元
23
发送控制程序
能否分送设定单元
23a
25
演示程序
26
显示单元
27
装置输入控制单元
27a
24
演示数据
24a
演示者 PC
40
用户 PC
40
用户 PC
10

图 1

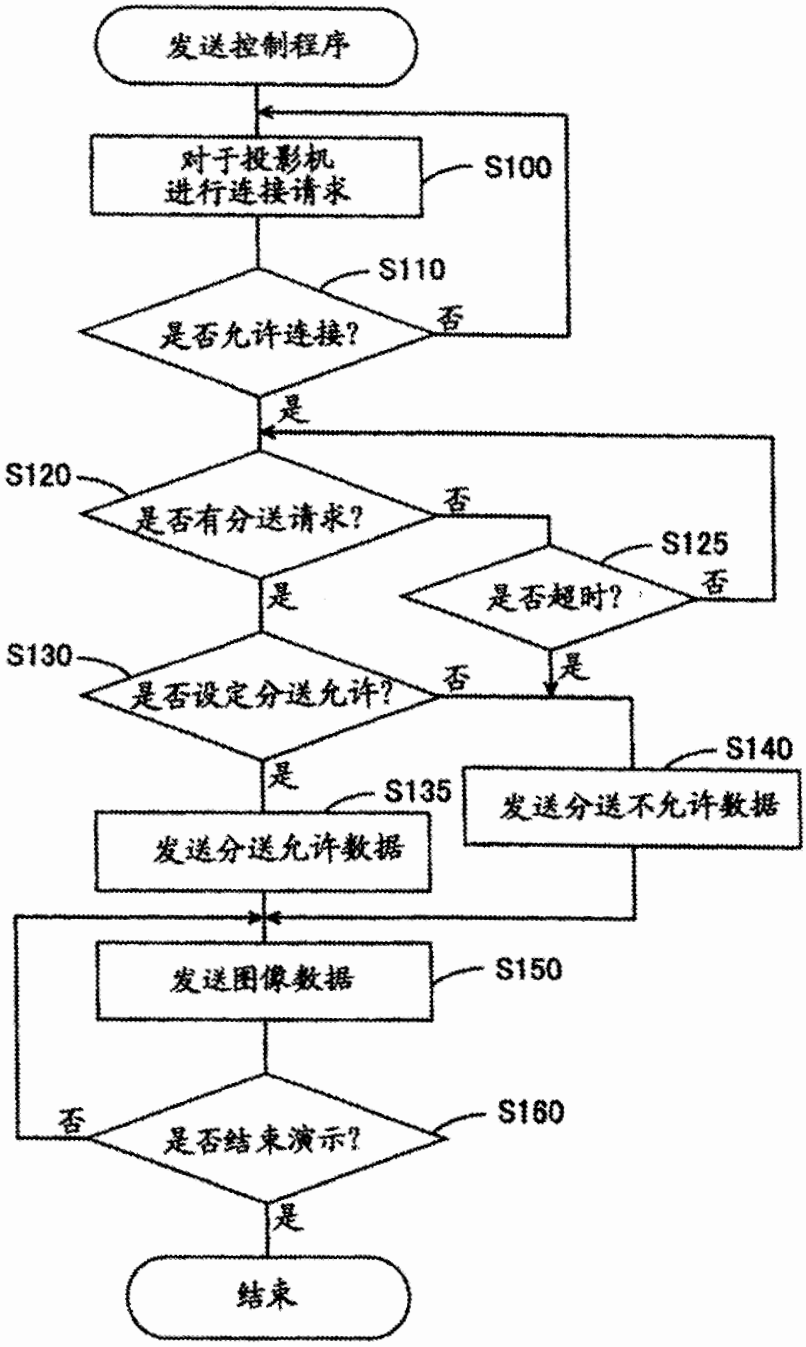

发送控制程序
对于投影机
进行连接请求
S100
S110
是否允许连接?
否
是
S120
是否有分送请求?
否
是
S125
是否超时?
否
是
S130
是否设定分送允许?
否
是
S135
发送分送允许数据
S140
发送分送不允许数据
发送图像数据
S150
S160
是否结束演示?
否
是
结束

图 2

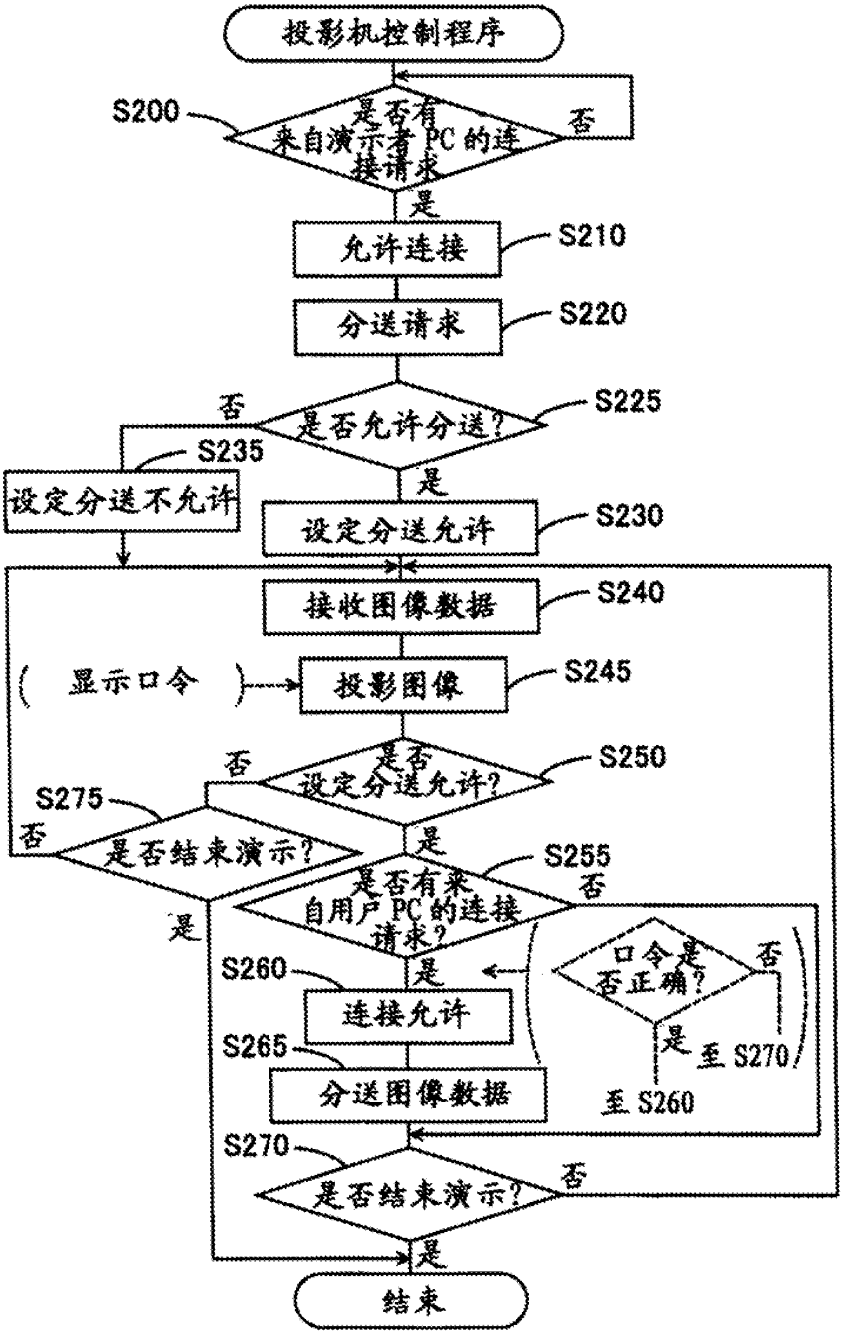

投影机控制程序
S200
是否有来自演示者 PC 的连接请求
否
是
允许连接
S210
分送请求
S220
否
是否允许分送?
S225
S235
设定分送不允许
是
设定分送允许
S230
接收图像数据
S240
显示口令
投影图像
S245
否
是否设定分送允许?
S250
S275
否
是否结束演示?
是
S255
是否有来自用户 PC 的连接请求?
否
是
口令是否正确?
否
是
至 S270
S260
连接允许
S265
分送图像数据
至 S260
S270
是否结束演示?
否
是
结束

图 3

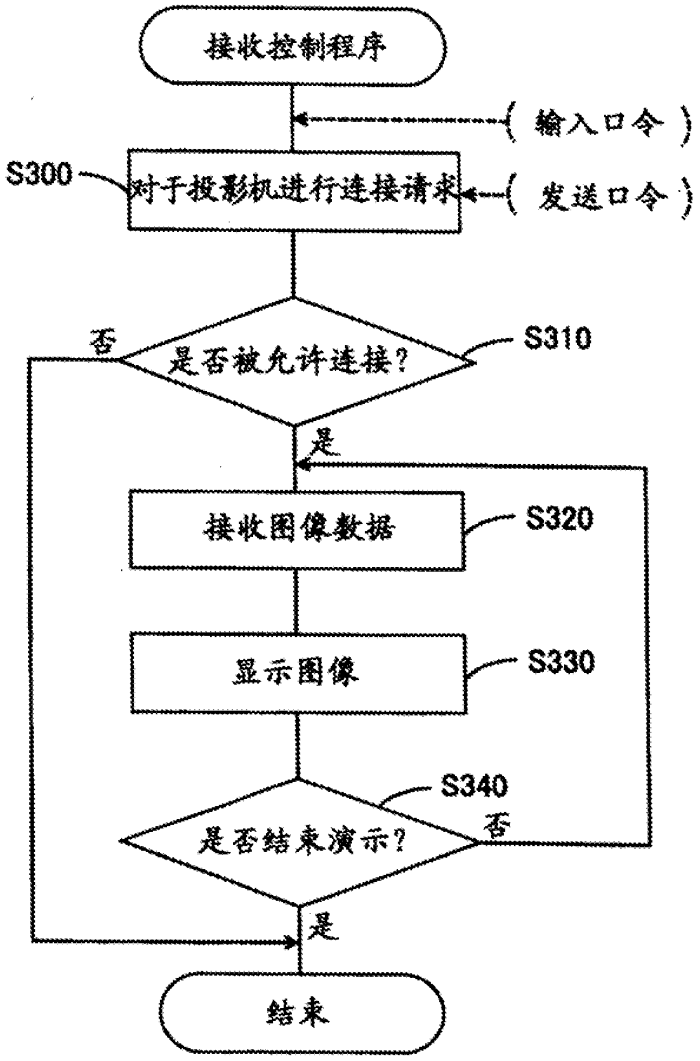

接收控制程序
(输入口令)
S300
对于投影机进行连接请求
(发送口令)
否
是否被允许连接?
S310
是
接收图像数据
S320
显示图像
S330
S340
是否结束演示?
否
是
结束

图 4

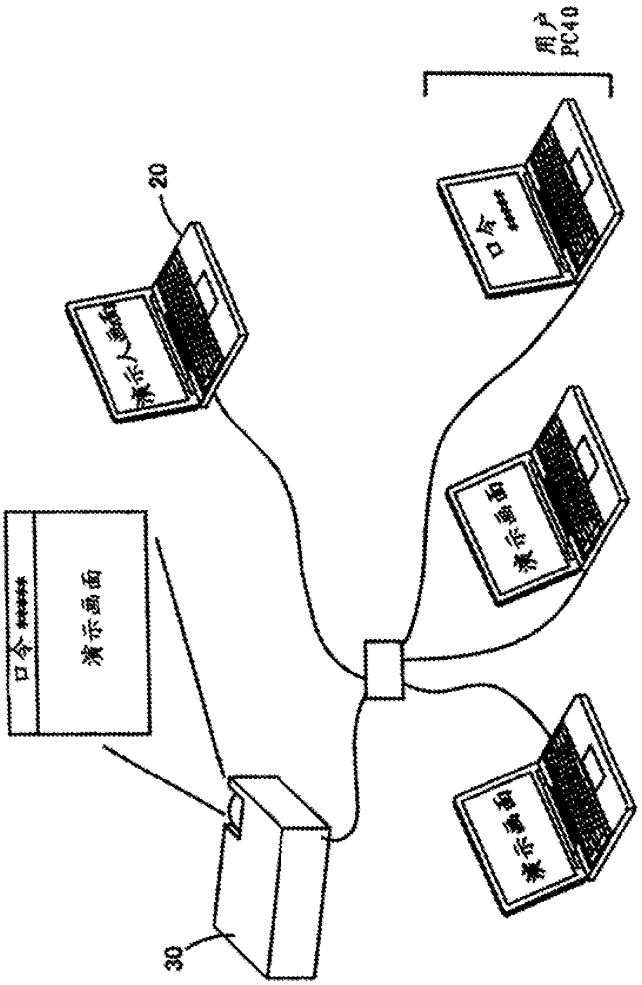


图 5

Espacenet

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Plug and play peripheral storing driver

Inventor(s): WILDE KEITH; HILL DOUG ± (WILDE KEITH, ; HILL DOUG)

Applicant(s): SMART TECHNOLOGIES ULC ± (SMART TECHNOLOGIES ULC)

Classification: - international: *G06F13/10; G06F3/00; G06F3/041; G06F9/445*
- cooperative: G06F9/4411; G06F9/4413

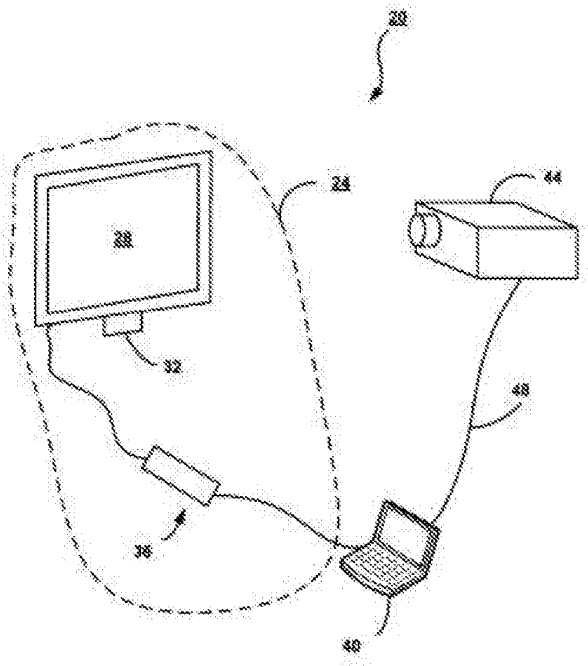
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Abstract of CN101454762 (A)

A plug-and-play device providing a set of functionality comprises a plug-and-play interface, storage, and software stored in the storage. The software is automatically executed by a computer when the plug-and-play device is connected thereto via the plug-and-play interface. The software detects disconnection of the plug-and-play device from the computer and terminates its execution in response thereto. The computer does not persistently store the software thereafter.



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US 20040201575 A1,2004.10.14,
US 20060081716 A1,2006.04.20,
US 20050278461 A1,2005.12.15, 说明书第34-35,37-41段、权利要求1,3、图4-5.
审查员 杨洁

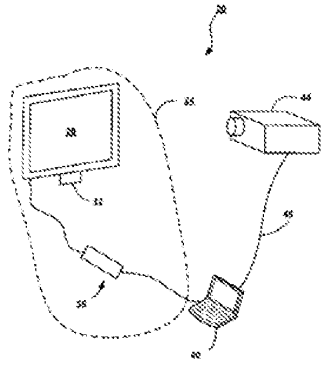
权利要求书2页 说明书6页 附图3页

(54)发明名称

一种交互式输入系统、用于该系统的即插即用电缆及一种交互方法

(57)摘要

一种提供一组功能的即插即用设备包括：即插即用接口；存储器；以及，在所述存储器内存储的软件。当所述即插即用设备经由所述即插即用接口而连接到计算机时，由所述计算机自动执行所述软件。所述软件检测所述即插即用设备与所述计算机的断开，并且响应于所述断开而终止其执行。此后，所述计算机不永久地存储所述软件。



CN 101454762 B

1. 一种交互式输入系统，包括：

具有控制器的交互式表面；

计算设备；以及

将所述计算设备连接到所述交互式表面以允许之间进行双向通信的即插即用电缆，所述即插即用电缆包括：

交互式表面接口；

计算设备接口；

存储器；以及

与所述存储器通信的集线器，所述集线器经由所述计算设备接口向所述计算设备提供存储在所述存储器内的可执行软件用于在将所述即插即用电缆连接到所述计算设备时由所述计算设备自动执行，当所述即插即用电缆将所述交互式表面和所述计算设备互联时，所述即插即用电缆进一步经由所述计算设备接口将校准设置通信到所述计算设备，其中所述校准设置使得由所述集线器提供的被所述计算设备自动执行的可执行软件将从所述交互式表面接收的触摸输入映射至计算设备显示坐标系，并且其中所述可执行软件自动检测所述即插即用电缆与所述计算设备的断开，并且响应于所述断开而终止执行，此后，所述计算设备不永久地存储所述可执行软件和校准设置。

2. 根据权利要求 1 所述的交互式输入系统，其中，所述交互式表面接口和计算设备接口是通用串行总线接口。

3. 根据权利要求 2 所述的交互式输入系统，其中，所述存储器存储 autorun 文件，其指定要自动执行的所述可执行软件。

4. 根据权利要求 3 所述的交互式输入系统，其中，所述存储器被配置为根据致密盘人类接口设备 (CD HID) 简档进行操作。

5. 根据权利要求 2 所述的交互式输入系统，其中，所述可执行软件被复制到在所述计算设备上的临时位置，并且从这个位置被执行，并且其中在从所述计算设备断开所述即插即用电缆时自动从所述临时位置终止和删除所述可执行软件。

6. 根据权利要求 2 所述的交互式输入系统，其中，所述可执行软件向所述计算设备的操作系统注册以后删除所述可执行软件的请求。

7. 根据权利要求 1 所述的交互式输入系统，其中，所述可执行软件被复制到在所述计算设备上的临时位置，并且从这个位置被执行，并且其中在从所述计算设备断开所述即插即用电缆时自动从所述临时位置终止和删除所述可执行软件。

8. 根据权利要求 1 所述的交互式输入系统，其中，所述可执行软件向所述计算设备的操作系统注册以后删除所述可执行软件的请求。

9. 根据权利要求 7 所述的交互式输入系统，其中，所述可执行软件执行存储在所述即插即用电缆的所述存储器中的所述可执行软件的实例，终止其自身的执行以及从所述即插即用电缆的所述存储器执行的所述可执行软件的实例，并且从所述计算设备中的所述临时位置删除所述可执行软件。

10. 根据权利要求 1 所述的交互式输入系统，其中，所述交互式表面显示计算机生成的图形用户界面。

11. 一种与交互式表面进行交互的方法，包括：

在计算设备和所述交互式表面之间连接包括存储器、集线器、计算设备接口和交互式表面接口的即插即用电缆；

通过所述即插即用电缆在所述计算设备和所述交互式表面之间建立双向通信；

自动定位被指定来执行的软件，所述软件被存储在所述即插即用电缆的存储器内，并且在所述计算设备上执行被定位的所述软件；

在所述即插即用电缆连接到所述计算设备和所述交互式表面时自动提取校准设置并且将所述校准设置提供给所述计算设备；

使用所述校准设置将从所述交互式表面接收的触摸输入映射到所述计算设备的所述显示坐标系；并且

在所述即插即用电缆与所述计算设备断开时，终止所述软件的执行，此后，所述计算设备不永久地存储所述软件和校准设置。

12. 根据权利要求 11 所述的方法，其中所述执行包括：将所述软件复制到在所述计算设备上的存储器。

13. 根据权利要求 12 所述的方法，还包括：

向所述计算设备的操作系统注册以后删除所述软件的请求。

14. 一种用于将交互式表面和计算设备互联并在之间建立双向通信的即插即用电缆，所述即插即用电缆包括：

交互式表面接口；

计算设备接口；

存储器；以及

与所述存储器通信的集线器，所述集线器经由所述计算设备接口向所述计算设备提供存储在所述存储器中的可执行软件用于在将所述即插即用电缆连接到所述计算设备时由所述计算设备自动执行，当所述即插即用电缆将所述交互式表面和所述计算设备互联时所述即插即用电缆进一步经由所述计算设备接口将校准设置通信到所述计算设备，其中所述校准设置使得由所述集线器提供的被所述计算设备自动执行的可执行软件将从所述交互式表面接收的触摸输入映射到计算设备显示坐标系，并且其中所述可执行软件自动检测所述即插即用电缆与所述计算设备的断开，并且响应于所述断开而终止执行，此后，所述计算设备不永久地存储所述可执行软件和校准设置。

15. 根据权利要求 14 所述的即插即用电缆，其中所述可执行软件被复制到在所述计算设备上的临时位置，并且从这个位置被执行，并且其中在从所述计算设备断开所述即插即用电缆时自动从所述临时位置终止和删除所述可执行软件。

16. 根据权利要求 14 所述的即插即用电缆，其中所述可执行软件向所述计算设备的操作系统注册以后删除所述可执行软件的请求。

一种交互式输入系统、用于该系统的即插即用电缆及一种交互方法

技术领域

[0001] 本发明一般地涉及计算机外围设备，具体涉及即插即用设备及其使用方法。

[0002] 背景技术

[0003] 即插即用设备是熟知的，并且存在许多类型的即插即用标准，包括通用串行总线（“USB”）、IEEE1394（“FireWire”）和PCMCIA（“PC卡”），最常见的是USB。这样的即插即用设备具有通过即插即用接口对计算机可访问的一组功能。这个功能可以包括但是不限于存储、输入注册、图像捕获、音频输入和输出等。许多组功能被定义为设备类。在将即插即用设备连接到计算机时，完成了电子电路，并且提醒所述计算机的操作系统所述连接。所述操作系统轮询所述即插即用设备以确定可以在即插即用设备上获得什么功能。

[0004] 许多操作系统具有多个预装的驱动器，用于一般的即插即用设备类，诸如USB海量存储器、双按钮鼠标等。如果操作系统具有用于连接到计算机的即插即用设备的设备类的驱动器，则所述驱动器被计算机安装，以便可以访问所述即插即用设备的功能，如果相反所述操作系统不具有用于即插即用设备的设备类的驱动器，则在许多情况下操作系统提示用户安装适当的软件，以使得计算机能够访问所述即插即用设备的功能。

[0005] Wong等人的公开号为2004/0205778的美国专利申请公开了包括驱动器存储器的外围设备。所述外围设备经由即插即用接口连接到计算机，并且对由所述计算机的操作系统识别的多个即插即用装置类的模拟进行循环，直到发现允许驱动器安装程序的自动执行的那个。

[0006] Gotze等人的公开号为2005/0038934的美国专利申请公开了可以在两个模式之间调节的基于USB的外部打印机。在第一模式内，打印机模拟USB海量存储器，以允许向打印机所连接的计算机上安装在打印机的存储器内存储的驱动器。一旦安装了驱动器，则打印机被调节到第二模式内，在该模式中其作为打印机工作。在计算机上安装的驱动器使得能够在打印机上打印。

[0007] 即插即用设备可以采用其他形式。例如，即插即用设备可以具有触摸板的形式，所述触摸板检测触摸输入，并且向所述触摸板所连接的计算机提供对应的输出。为了计算机正确地解译触摸板输出，需要执行校准过程，以便将触摸板输入区的坐标系映射到计算机显示坐标系。在已经执行了校准过程后，结果产生的校准设置被计算机存储，以便可以将触摸板输出正确地映射到计算机显示坐标系。但是，可以明白，所述校准设置对于计算机是特定的。如果触摸板被插入另一个计算机，则必须重新执行校准过程。

[0008] 在多种情况下会不期望有安装软件／驱动器的需要，诸如用户没有计算机的管理权或者仅仅不期望在计算机上安装更多的软件，特别是即插即用设备的连接不常发生或者是一次性的事务。安装软件也可以证明是困难和复杂的任务。例如，用户可能需要从因特网下载软件，或者可能需要定位所述软件／驱动器所定位于的媒体。

[0009] 因此，本发明的目的是提供一种新颖的即插即用设备及其使用方法。

发明内容

[0010] 因此，在一个方面，提供了一种提供一组功能的即插即用设备，包括：

[0011] 即插即用接口；

[0012] 存储器；以及

[0013] 存储在所述存储器内的软件，当所述即插即用设备经由所述即插即用接口而连接到计算机时，由所述计算机自动执行所述软件，所述软件可用于检测所述即插即用设备与所述计算机的断开，并且响应于所述断开而终止其执行，此后，所述计算机不永久地存储所述软件。

[0014] 在一个实施例内，所述软件使得所述计算机能够访问由所述即插即用设备提供的所述一组功能。所述即插即用接口可以是通用串行总线接口。所述存储器可以存储autorun.inf文件，其指定要执行的软件。所述软件可以被复制到在所述计算机上的临时位置，并且从这个位置被执行，并且可以在从所述计算机断开所述即插即用设备时终止和删除所述软件。

[0015] 按照另一个方面，提供了一种与计算机一起使用即插即用设备的方法，包括：

[0016] 检测即插即用设备与所述计算机的连接；

[0017] 自动定位被指定来执行的软件，所述软件被存储在所述即插即用设备的存储器内；

[0018] 利用所述计算机执行所述软件；并且

[0019] 在所述即插即用设备与所述计算机断开时，终止所述软件的执行。

[0020] 按照另一个方面，提供了一种即插即用设备，包括：

[0021] 存储器；以及

[0022] 存储在所述存储器内的设置，所述设置与一组功能相关联。

[0023] 所述即插即用设备可以还包括存储在所述存储器内的软件，当所述即插即用设备与计算机连接时，所述软件提供对所述一组功能的访问。在这种情况下所述一组功能是由所述即插即用设备提供的输入接口。

[0024] 可选地，所述即插即用设备可以包括存储在存储器内的软件，所述软件在所述即插即用设备所连接的计算机上可执行，并且提供对所述一组功能的访问。所述软件可以在执行期间引用所述设置。当所述即插即用设备经由计算机的即插即用接口与所述计算机连接时，所述计算机可以自动执行所述软件，并且所述软件检测所述即插即用设备与所述计算机的断开，并且响应于所述断开而终止执行。在这种情况下，所述计算机此后不永久地存储所述软件。

[0025] 按照另一个方面，提供了一种用于接收输入的即插即用设备，包括：

[0026] 即插即用接口；

[0027] 触摸板，其上显示计算机产生的图像；

[0028] 存储器；以及

[0029] 校准设置，其被存储在所述存储器内，并且对触摸板和计算机产生的图像坐标系进行映射。

[0030] 按照另一个方面，提供了一种提供一组功能的即插即用设备，包括：

[0031] 即插即用接口；

[0032] 存储器；以及

[0033] 存储在所述存储器内的软件，所述软件被复制到所述计算机，并且当所述即插即用设备连接到所述计算机时从其自动被执行，所述软件提供对所述即插即用设备的所述一组功能的访问。

[0034] 通过在所述即插即用设备自身上存储用于所述即插即用设备的软件并且当所述即插即用设备连接到所述计算机时自动将所述软件安装到所述计算机上，所述即插即用设备的用户不必在计算机上预先安装软件 / 驱动器以便访问由所述即插即用设备提供的功能，用户也不需要计算机的管理权限以便使用所述软件。因为在终止时所述软件不永久地被存储在计算机上，因此所述计算机被留在与在连接到所述即插即 用设备之前其所处的状态相同的一般状态。而且，通过在所述即插即用设备上存储设置，当新的计算机连接到所述即插即用设备时，不必执行建立过程。

附图说明

[0035] 现在，将参考附图更全面地说明实施例，其中：

[0036] 图 1 示出了包括触摸板、控制器和电缆的连接到计算机的即插即用设备；

[0037] 图 2 示出了图 1 的电缆的示意图；以及

[0038] 图 3 是图 1 的即插即用设备的一般操作的流程图。

具体实施方式

[0039] 图 1 图解了系统 20，其包括即插即用设备 24，用于对输入进行接收和数字化。在本实施例中，所述即插即用设备 24 包括触摸板 28、控制器 32 和电缆 36。触摸板 28 是由阿尔伯塔省卡尔加里市 (Calgary, Alberta) 的 SMART 技术公司以 SMARTBoard™ 的名称制造和销售的类型。控制器 32 控制触摸板 28 的操作，并且经由电缆 36 与计算机 40 通信。LCD 投影机 44 经由 VGA 电缆 48 连接到计算机 40。计算机 40 控制 LCD 投影机 44 将图像投影到触摸板 28 上而不是在计算机 40 的显示器上呈现。投影机 44 可以位于触摸板 28 的前方或者后方。

[0040] 触摸板 28 向用户提供经由用于提供输入的、诸如笔工具或者手指的指针来与被投影的图像交互的能力。除了由计算机 40 的操作系统提供来作为鼠标工作的软件之外，触摸板 28 不需要额外软件。触摸板 28 的功能被在所述操作系统上不可获得的其他软件大大地增强。如下所述。

[0041] 控制器 32 包括处理器（未示出），其执行存储在非易失性存储器内的固件。一般地，所述固件使得控制器 32 在两个操作模式之一下工作。在初始模式内，控制器 32 操作两个 USB 简档，即绝对鼠标人机接口设备（“HID”）简档和 SMARTBoard HID 简档。所述绝对鼠标 HID 简档允许控制器 32 在指针输入被触摸板 28 检测到时响应于与基本的鼠标功能一起的指针输入而中继绝对位置信息。所述 SMARTBoard HID 是专用的设备类，其能够增强触摸板 28 的功能。被增强的功能包括在绝对鼠标 HID 设备类内可以获得的所有功能外加链接信息、附加的工具信息（按钮、消除器、笔工具选择等）和与控制器 32 的双向通信。在“本地的”操作模式内，控制器 32 终止所述绝对鼠标 HID 简档，并且仅仅操作 SMARTBoard HID 简档。

[0042] 参考图 2 描述电缆 36 的部件。电缆 36 包括 :USB 集线器部件 52,其具有第一 USB 接口 56,用于连接到延伸到触摸板 28 的 USB 电缆 60 ;以及,第二 USB 接口 64,用于连接到延伸到计算机 40 的 USB 电缆 68。第一和第二 USB 接口 56、64 与 USB 集线器 72 通信。

[0043] 被配置按照致密盘 ("CD")HID 简档而工作的存储器 76,即快闪存储器也与 USB 集线器 72 通信。CD HID 简档使得存储器 76 如同 CD 驱动器工作。存储器 76 存储一组软件应用,包括用户应用 (SMARTBoardTools.exe)、服务 (SMARTBoardService.exe)、启动器应用 (SBLauncher.exe)、校准应用 (SMARTBoardCalibrate.exe) 和引用启动器应用的 autorun.inf。而且,存储器 76 可以存储与系统 20 的配置相关联的校准设置。具体地,所述校准设置包括用于利用由 LCD 投影机 44 投影在触摸板 28 的表面上的图像输出来映射由触摸板 28 接收的指针输入的数据。LCD 投影机 44 和触摸板 28 一般相对于彼此固定。结果,一旦通过校准过程确定了它们的相对位置,其中所述校准过程被执行以便产生校准设置、LCD 投影机 44 和触摸板 28 的相对位置,因此就不需要重新确定所述校准设置。

[0044] SMARTBoardTools.exe 应用允许比基本鼠标功能更丰富的一组特征。其包含多个呈现应用、与流行绘图和呈现应用的整合、以及允许用户在任何应用内的文件上或者在计算机 40 的图形用户界面的桌面上 描画的应用,所述图形用户界面的桌面被投影触摸板 28 的表面上并在其上显示。

[0045] 在图 3 内示出了即插即用设备 24 的操作的方法。当即插即用设备 24 连接到计算机 40(步骤 104),并且即插即用设备 24 到计算机 40 的连接被计算机 40 的操作系统检测到时,计算机 40 查询所述即插即用设备 24 以确定即插即用设备 24 提供什么功能 (步骤 108)。当 USB 集线器 72 连接到存储器 76 以及控制器 32 时,USB 集线器 72 查询这两个单元的每个以确定可以获得哪些简档。在本实施例中,存储器 76 通过指示其支持 CD HID 简档而响应。处于初始模式内的控制器 32 通过指示其支持绝对鼠标 HID 简档和 SMARTBoard HID 简档来响应。

[0046] 计算机 40 在接收到这个简档信息时检测对于即插即用设备 24 可以获得的下面的功能 :绝对鼠标 HID 简档、SMARTBoard HID 简档和 CDHID 简档 (步骤 112)。计算机 40 继而安装用于由所述操作系统识别的设备功能的驱动器 (即,对于所述设备功能,所述操作系统具有驱动器) ;即,绝对鼠标 HID 和 CD HID(步骤 116)。当计算机 40 检测到这些功能组的每个时,计算机 40 将它们识别为独立的设备。在这个实施例内的计算机 40 不安装 SMARTBoard HID 简档,因为计算机 40 的操作系统不具有对应的驱动器。计算机 40 然后向被检测的 CD HID 设备分配下一个可以获得的驱动器字母 (步骤 120)。

[0047] 计算机 40 像大多数计算机一样由缺省配置来配置 ;即,其被配置来对于 CD HID 设备搜索名称为 autorun.inf 的文件,所述文件引导计算机 40 来在连接到 CD HID 设备时自动执行特定应用。因此,计算机 40 对于 CD HID 设备查询 autorun.inf,并且在接收到它时,载入和执行在其内包含的指令 (步骤 124)。autorun.inf 文件被 Microsoft Windows® 家族的操作系统使用来在特定条件下在检测到特定类型的存储器时执行其中包含的指令。例如,在特定条件下,当包含 autorun.inf 文件的 CD-ROM 盘被插入 CD-ROM 驱动器的盘架时执行 autorun.inf 文件。执行通常在计算机 的操作系统可以获得或者识别了在 autorun.inf 文件内的信息后开始而没有延迟。

[0048] 所述 autorun.inf 文件包含指向可执行的启动器应用 SBLauncher.exe 的指

针。在解析 autorun.inf 文件后，计算机 40 使用所述指针来与一组对应的动态链接库（“DLL”）一起从存储器 76 获得 SBLauncher.exe 应用，并且执行 SBLauncher.exe 应用（步骤 128）。SBLauncher.exe 应用继而将计算机 40 引导来与一些相关联的 DLL 一起地、从存储器 76 向在计算机 40 上的临时目录复制两个可执行文件，即 SMARTBoardTools.exe 和 SMARTBoardService.exe，并且执行它们（步骤 132）。在执行 SMARTBoardService.exe 服务时，所述 SBLauncher.exe 应用终止执行，并且 SMARTBoardService.exe 服务引导计算机 40 来向控制器 32 发送命令，以切换到 SMARTBoard HID 模式（步骤 136）。

[0049] 在启动时，SMARTBoardTools.exe 应用从即插即用设备 24 的存储器 76 查询并且获得校准设置和其他设置（步骤 140）。所述校准设置使得 SMARTBoardTools.exe 应用能够将从触摸板 28 接收的触摸输入映射到计算机显示坐标系。其他设置包括笔盘设置、COM 端口设置、接触过滤设置和用于一些软件应用的用户设置。所有这些设置被存储在标准的 Windows INI 文件内。而且，使用几个 XML 文件来存储用于形成部分 SMARTBoardTools.exe 应用的各种小应用程序的布局和菜单设置。这些小应用程序提供了用于访问各种功能的工具按钮的浮动窗口、在屏键盘等。这些布局和菜单设置被存储在即插即用设备 24 的存储器 76 内的 XML 文件内，并且在 SMARTBoardTools.exe 应用的执行期间被载入和存储在用户目录“C:\Documents and Settings\<user name>\ApplicationData\SMART Technologies Inc.\SMARTBoard Software\”中，其中，<username> 是当前用户的登录名。

[0050] 在获得校准设置时，SMARTBoardTools.exe 应用允许用户与触摸板 28 的交互，所述触摸板 28 将相对于由 LCD 投影机 44 在触摸板 28 的表 面上投影的图像在空间上对准。在执行期间，一些设置被存储在注册表的“HKEY_CURRENT_USER”键内，并且具体地被存储在“Software\SMART Technologies Inc.\SMARTBoard Software\”子键内。这些设置包括应用窗口位置、每个应用的用户设置和近期使用的文件的列表。使用“HKEY_CURRENT_USER”键，因为对于对这个键进行的修改通常没有限制。另外，如果对于“HKEY_CURRENT_USER”键没有访问限制，则在那里写入拼写检查程序设置。

[0051] 在终止所述会话时，可以将计算机 40 从即插即用设备 24 拔出并且移除。当断开即插即用设备 24 时，计算机 40 通知 SBLauncher.exe 应用（步骤 144）。SBLauncher.exe 应用终止 SMARTBoardTools.exe 应用、SMARTBoardService.exe 服务、各种相关的 DLL 和设置的执行，并且从在计算机 40 上的临时位置将它们删除，然后终止其自身的执行（步骤 148）。在终止所述 SBLauncher.exe 应用的执行之前，SBLauncher.exe 应用向 XML 文件写入存储在“C:\Documents and Settings\<username>\Application Data\SMART TechnologiesInc.\SMARTBoardSoftware\”内的用户设置，并且 SBLauncher.exe 应用然后将所述 XML 文件存储在即插即用设备 24 的存储器 76 内。SBLauncher.exe 应用然后删除这些设置和存储在注册表内的设置。一旦从计算机 40 删除了所述设置，则 SBLauncher.exe 应用将一个输入项置于 HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\RunOnce 注册表键内，其当用户接着登录时告知 Windows 删除 SBLauncher.exe 应用，然后终止其执行。

[0052] 如果用户通过关闭 SMARTBoardTools.exe 应用来停止 SMARTBoard 软件，则 SBLauncher.exe 应用执行在即插即用设备 24 的存储器 76 内发现的其自身的实例，导致存储在计算机 40 上的 SBLauncher.exe 应用的实例被删除。

[0053] 如上所述，为了相对于由 LCD 投影机 44 投影在触摸板 28 上的图像 进行的触摸输

入在空间上与被投影的图像对准，必须校准系统 20。因为在由 LCD 投影机 44 投影的图形和触摸板 28 之间的空间关系仅仅当 LCD 投影机 44 和触摸板 28 相对于彼此移动时才改变，因此一般在触摸板 28 和 LCD 投影机 44 被固定在位置上后执行校准。为了校准系统 20，启动 SMARTBoardCalibrate.exe 应用。一旦被启动，则提示用户触摸在触摸板 28 的表面上显示的计算机 40 的图形用户界面上的多个点。产生的触摸板输出用于将由触摸板 28 对准的原始触摸坐标映射到计算机显示坐标系。新捕获的校准设置然后被记录在 Windows INI 文件内，以便它们可以被其他计算机用于利用在其上呈现的图形用户界面来映射从即插即用设备 24 接收的输入。

[0054] 虽然已经针对 USB 说明了系统 20，但是可以使用其他类型的即插即用架构。例如，本领域内的技术人员容易明白，如何将在此所述的系统 20 适应于用于 FireWire 和 PCMCIA 架构等。

[0055] 所述即插即用设备的驱动器可以被存储在独立的 CD HID 设备等上。类似地，校准设置可以存储在独立的可装卸存储器上，诸如 USB 快闪驱动器、可重写光盘等。以这种方式，可以使得现有的校准设置对于连接到所述即插即用设备的其他计算机是可获得的。可选地，可以使用由 SMARTBoard HID 简档启动的双向通信将所述校准设置存储在触摸板的控制器上。

[0056] 在如上所述的实施例内，即插即用设备 24 包括电缆 36，其具有 USB 集线器部件 52，所述 USB 集线器部件 52 经由 USB 电缆 60 而连接到触摸板 28，并且经由 USB 电缆 68 连接到计算机 40。本领域内的技术人员可以明白，USB 集线器部件 52 可以包括一个或多个无线通信接口，用于使得能够通过无线通信信道来执行在触摸板 28 和 USB 集线器部件 52 之间和 / 或在 USB 集线器部件 52 和计算机 40 之间的通信，由此消除对于物理电缆的需要。USB 集线器部件 52 也可以被集成到触摸板 28 内，以便仅仅需要在 USB 集线器部件 52 和计算机 40 之间的有线或者无线的一个通信信道。

[0057] 虽然系统 20 被示出为包括用于向触摸板 28 的表面上投影图像的 LCD 投影机 44，但是本领域内的技术人员可以明白，其他配置是可能的。例如，触摸板 28 可以是在 Morrison 等人的专利号是 6,803,906 的美国专利内公开的形式或者 Morrison 等人的申请号是 11/331,448 的美国专利申请内公开的形式。在这种情况下，触摸屏 28 位于显示单元之上，所述显示单元诸如等离子体显示器或者 LCD 显示器，其从计算机 40 接收显示输入。

[0058] 虽然已经参考触摸板而描述了所述系统，但是所述系统可以是多种其他设备的任何一种，诸如摄像机、声音系统等。例如，当所述即插即用设备是声音系统时，所述设置可以包括已经对于所设置的配置被预先校准到期望水平的、每个扬声器的输出音量。

[0059] 虽然已经参考附图描述了一个实施例，但是本领域内的技术人员可以明白，在不脱离由所附的权利要求限定的其精神和范围的情况下，可以进行修改和变化。

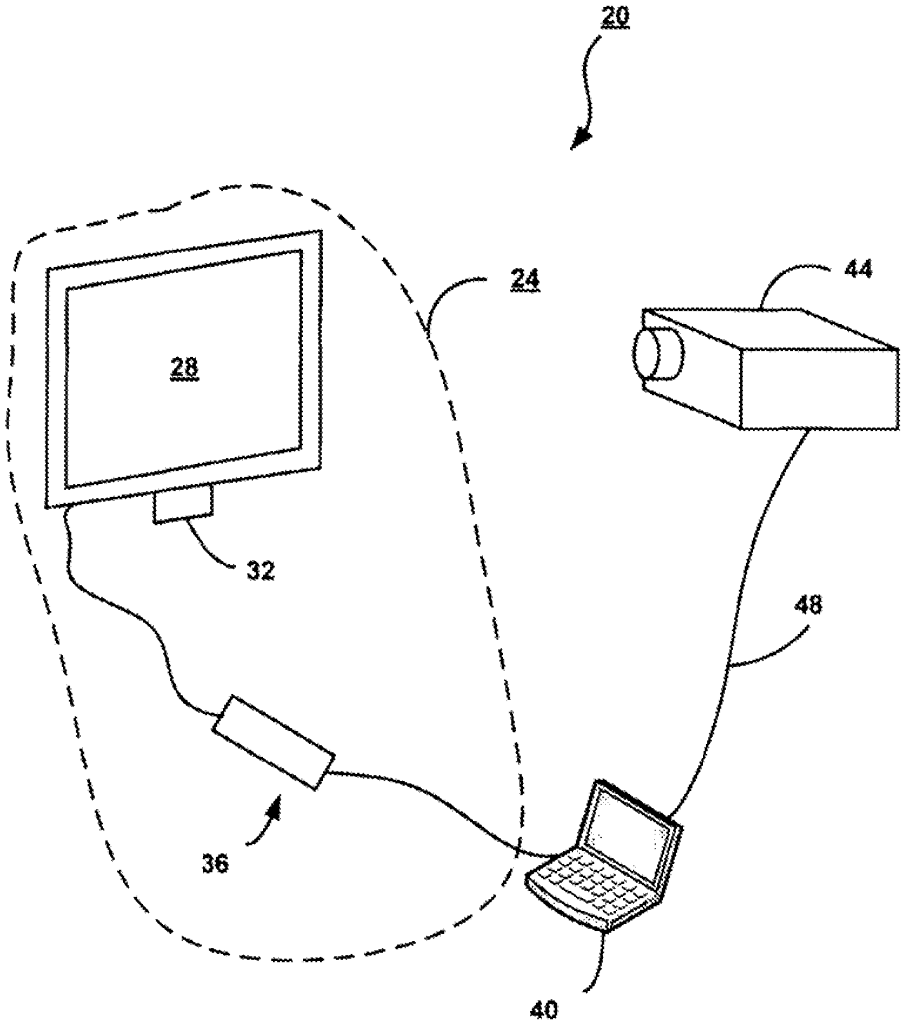


图 1

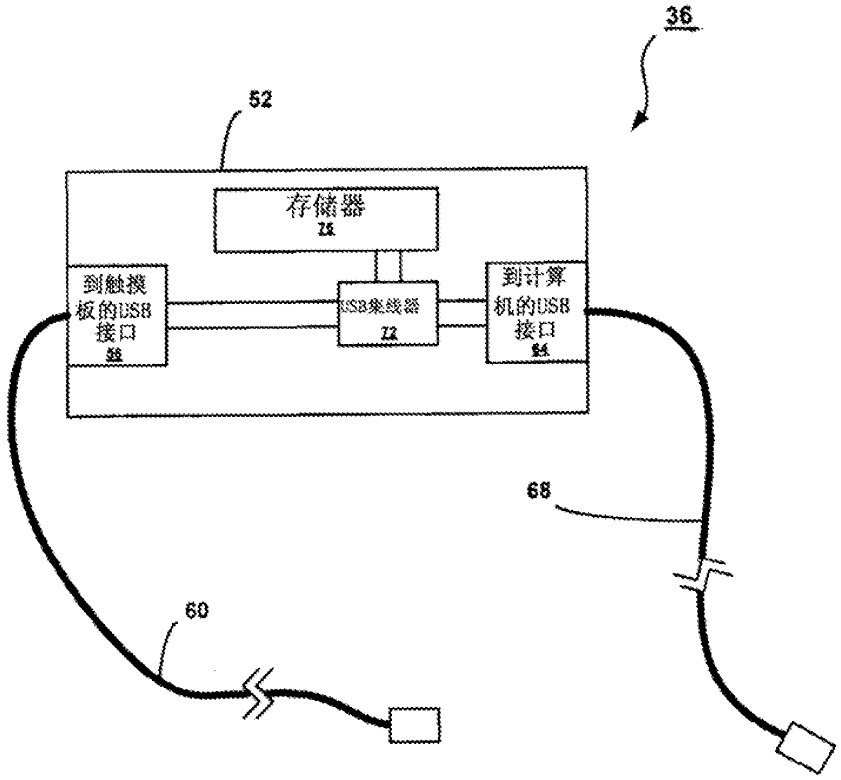


图 2

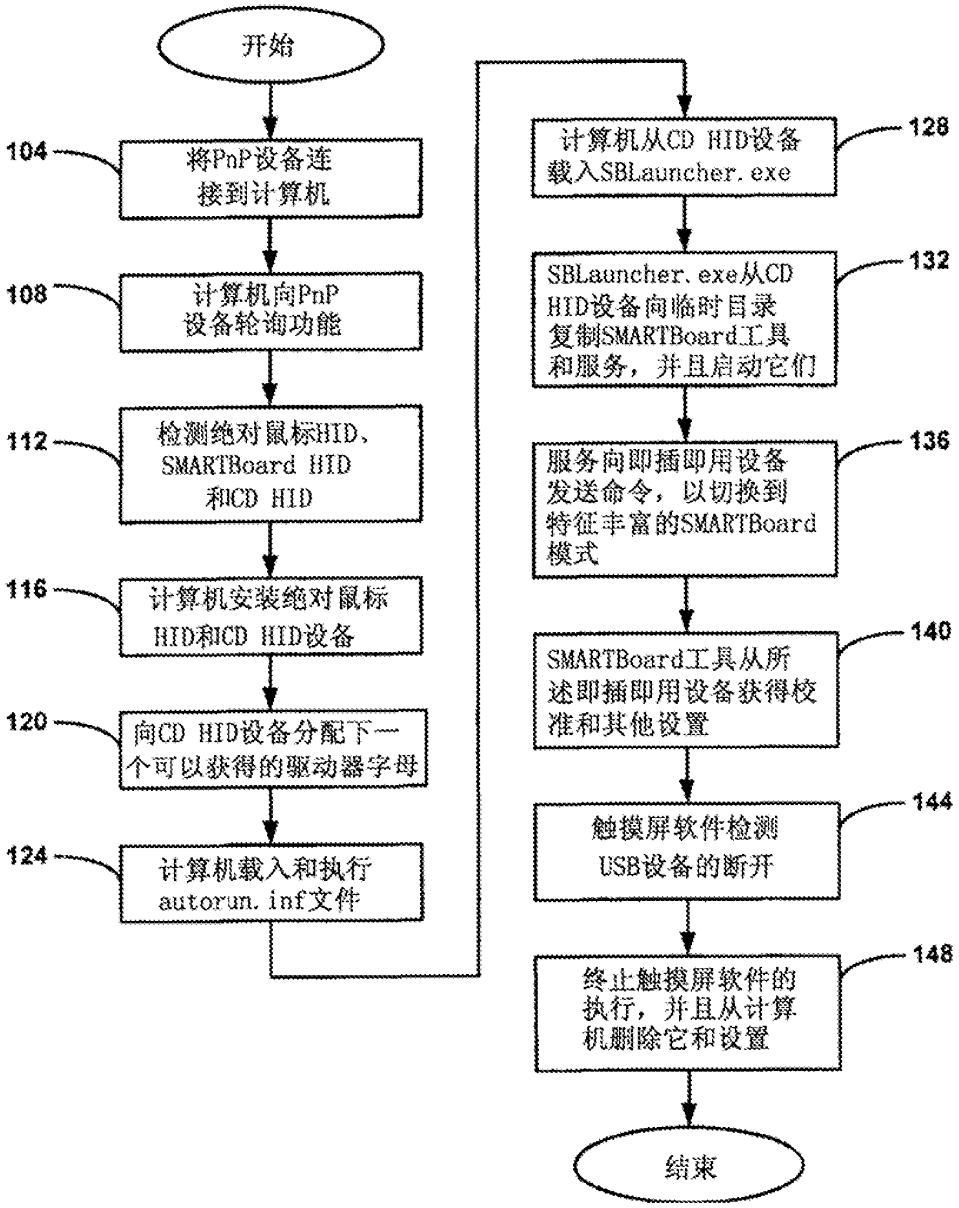

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结束

图 3

Espacenet

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Embedded high definition conference terminal and formation method thereof

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Abstract of CN101631223 (B)

The invention discloses an embedded high definition conference terminal, comprising an X86 hardware platform, an embedded operating system capable of being compactible with various X86 hardware, and conference software running under the embedded operating system. The invention also discloses a formation method of the embedded high definition conference terminal, comprising the steps of analyzing the hardware information of the X86 hardware possibly adopted by the embedded high definition conference terminal to be formed, establishing corresponding hardware component information, manufacturingthe conference software running on the embedded high definition conference terminal into an XPE or WES component, and guiding into a component data library, constructing an XPE or WES system image file provided with the conference software,; and guiding in the XPE or WES system image file to the formed X86 hardware platform. The invention has the beneficial effect of effectively solving the compatibility of X86 hardware platform and having stable performance.

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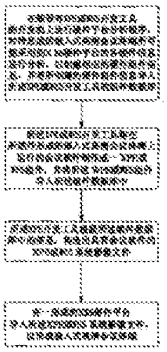
权利要求书 1 页 说明书 3 页 附图 2 页

(54)发明名称

嵌入式高清会议终端及其形成方法

(57)摘要

本发明揭示了一种嵌入式高清会议终端，包括：X86 硬件平台；能兼容各种 X86 硬件的嵌入式操作系统；能在所述嵌入式操作系统下运行的会议软件。本发明还揭示了一种形成嵌入式高清会议终端的方法，包括对待形成的嵌入式高清会议终端所可能采用的 X86 硬件平台的各硬件信息进行分析，以创建相应的硬件组件信息、将在所述待形成的嵌入式高清会议终端上运行的会议软件制作成一 XPE 或 WES 组件，并导入所述组件数据库中、构造具有会议软件的 XPE 或 WES 系统影像文件、在一形成的 X86 硬件平台导入所述 XPE 或 WES 系统影像文件的步骤。本发明的有益效果在于：能够有效地解决 X86 硬件平台的兼容性问题，性能稳定。



CN 101631223 B

1. 一种形成嵌入式高清会议终端的方法，其特征在于，包括以下步骤：

步骤 1、在装设有 Windows XP Embedded 或 Windows Embedded Standard 开发工具的开发机上运行硬件平台分析程序，对待形成的嵌入式高清会议终端所可能采用的 X 86 硬件平台的各硬件信息进行分析，以创建相应的硬件组件信息，并将所创建的硬件组件信息导入所述 Windows XP Embedded 或 Windows Embedded Standard 开发工具的组件数据库；

步骤 2、所述 Windows XP Embedded 或 Windows Embedded Standard 开发工具将在所述待形成的嵌入式高清会议终端上运行的会议软件制作成一 XPE 或 WES 组件，并将所述 XPE 或 WES 组件导入所述组件数据库中；

步骤 3、所述 Windows XP Embedded 或 Windows Embedded Standard 开发工具根据所述组件数据库中的信息，构造出具有会议软件的 XPE 或 WES 系统影像文件；

步骤 4、在一形成的 X86 硬件平台导入所述 XPE 或 WES 系统影像文件，以形成嵌入式高清会议终端。

2. 如权利要求 1 所述的形成嵌入式高清会议终端的方法，其特征在于：所述 XPE 或 WES 系统影像文件小于 200M。

3. 如权利要求 2 所述的形成嵌入式高清会议终端的方法，其特征在于：所可能采用的 X86 硬件平台包括 Intel、华硕、MSI、及硕泰。

嵌入式高清会议终端及其形成方法

技术领域

[0001] 本发明涉及一种嵌入式高清会议终端及其形成方法，特别涉及一种具有自动硬件识别功能的嵌入式高清会议终端及其形成方法。

背景技术

[0002] 视频会议终端市场正面临着巨大的转变。几年以前，机顶盒和移动系统在视频会议市场中占据了主导地位，它们主要都是通过 ISDN 连接，然而当今的市场已开始逐渐转变，视频网络迅速向 IP 网络转变，这不仅影响了会议系统的连接方式，还使视频终端从独立的电信终端转变为了公司 IT 设备中基于 IP 的部分。网络会议和即时通信的广泛流行促使视频会议终端应与整个多媒体视频会议市场相协调。

[0003] 芯片技术的发展使新型的基于软件的 PC 桌面办公变得切实可行。随着价格的逐渐稳定，设备提供商竞相把平面集成系统组装到行政级桌面上；在另一方面，高端“远程显现”系统也模拟把远端与会者带入同一会议室中，这种身临其境的效果在视频质量和带宽能够满足用户需求时。无论是从用户还是从设备提供商来看，中国都是一个炙手可热的市场。显而易见，视频会议终端的市场正经历着转变。

[0004] 在会议终端中，给予嵌入式 XPE 或 WES 的 X86 系列平台的会议终端十分受市场欢迎，然而，由于 X86 平台硬件芯片厂家太多，很容易发生兼容性的问题，而无法开发一块稳定的嵌入式高清会议终端。

发明内容

[0005] 本发明的所要解决的技术方案是提供一种嵌入式高清会议终端及其形成方法，以解决现有技术的不足。

[0006] 为解决上述技术方案，本发明提供一种嵌入式高清会议终端，包括：X86 硬件平台；采用 Microsoft Target Designer 生成的能兼容各种 X86 硬件的嵌入式操作系统；能在所述嵌入式操作系统下运行的会议软件、其包括支持传送与接收图像信号及声音信号的视频会议软件、及音视频解码软件。

[0007] 较佳的，所述 X86 硬件平台包括主板、CPU、显卡、网络适配器、声卡、储存设备、显示器、输入设备及摄像头。

[0008] 较佳的，所述音视频解码软件支持 1280*720 以上的分辨率。

[0009] 较佳的，所述音视频解码软件支持 MPEG1、MPEG2、MPEG4、H.263、H.264、及 H.264+ 格式。

[0010] 较佳的，所述嵌入式操作系统及所述会议软件小于 200MB。

[0011] 一种形成嵌入式高清会议终端的方法，包括以下步骤：步骤 1、在装设有 Windows XP Embedded 或 Windows Embedded Standard 开发工具的开发机上运行硬件平台分析程序，对待形成的嵌入式高清会议终端所可能采用的 X86 硬件平台的各硬件信息进行分析，以创建相应的硬件组件信息，并将所创建的硬件组件信息导入所述 Windows XP

Embedded 或 Windows Embedded Standard 开发工具的组件数据库；步骤 2、所述 Windows XP Embedded 或 Windows Embedded Standard 开发工具将在所述待形成的嵌入式高清会议终端上运行的会议软件制作成一 XPE 或 WES 组件，并将所述 XPE 或 WES 组件导入所述组件数据库中；步骤 3、所述 Windows XP Embedded 或 Windows Embedded Standard 开发工具根据所述组件数据库中的信息，构造出具有会议软件的 XPE 或 WES 系统影像文件；步骤 4、在一形成的 X86 硬件平台导入所述 XPE 或 WES 系统影像文件，以形成嵌入式高清会议终端。

[0012] 较佳的，所述 XPE 或 WES 系统影像文件小于 200M。

[0013] 较佳的，所可能采用的 X86 硬件平台包括 Intel、华硕、MSI、及硕泰。

[0014] 本发明的有益效果在于：能够有效地解决 X86 硬件平台的兼容性问题，性能稳定。

附图说明

[0015] 图 1 为嵌入式会议终端构成示意图。

[0016] 图 2 为形成嵌入式高清会议终端的方法。

具体实施方式

[0017] 下面结合附图详细说明本发明的优选实施例。

[0018] 请参阅图 1，一种嵌入式高清会议终端，包括：

[0019] X86 硬件平台，包括主板、CPU、显卡、网络适配器、声卡、储存设备、显示器、输入设备及摄像头；

[0020] 采用 Microsofi Target Designer 生成的能兼容各种 X86 硬件的嵌入式操作系统；

[0021] 能在所述嵌入式操作系统下运行的会议软件、其包括支持传送与接收图像信号及声音信号的视频会议软件、及音视频解码软件，其中，所述音视频解码软件支持 1280*720 以上的分辨率，所述音视频解码软件支持 MPEG1、MPEG2、MPEG4、H.263、H.264 及 H.264+ 格式，所述嵌入式操作系统及所述会议软件小于 200MB。

[0022] 请参阅图 2，一种形成嵌入式高清会议终端的方法，包括以下步骤：

[0023] 步骤 1、在装设有 Windows XP Embedded 或 Windows Embedded Standard 开发工具的开发机上运行硬件平台分析程序（即 Target Analyzer 工具），对待形成的嵌入式高清会议终端所可能采用的 X86 硬件平台的各硬件信息进行分析，以创建相应的硬件组件信息，并将所创建的硬件组件信息导入所述 Windows XP Embedded 或 Windows Embedded Standard 开发工具的组件数据库；具体地说，运行 Target Designer 工具，在预订目录下生成 Devices.pmq 文件，文件将包含 X86 平台的硬件信息，将 Devices.pmq 文件生成 XPE(Windows XP Embedded) 或 WES(Windows Embedded Standard) 组件，保存至组件数据库中，在多种 X86 平台上运行 TargetDesigner 工具，得到各种 X86 硬件平台的硬件信息，保存至组件数据库中，将所有 Devices.pmq 文件生成的宏组件 Demo Platform Component，加入配置 (Configuration) 中，如此，各个 X86 硬件平台的信息全部添加到配置中。

[0024] 步骤 2、所述 Windows XP Embedded 或 Windows Embedded Standard 开发工具将

在所述待形成的嵌入式高清会议终端上运行的会议软件制作成一 XPE 或 WES 组件，并将所述 XPE 或 WES 组件导入所述组件数据库中；

[0025] 步骤 3、所述 Windows XP Embedded 或 Windows Embedded Standard 开发工具根据所述组件数据库中的信息，构造出具有会议软件的 XPE 或 WES 系统影像（Image）文件；

[0026] 步骤 4、在一形成的 X86 硬件平台导入所述 XPE 或 WES 系统影像文件，以形成嵌入式高清会议终端。

[0027] 进一步的，所述 XPE 或 WES 系统文件小于 200M。

[0028] 进一步的，所可能采用的 X 86 硬件平台包括 Intel、华硕、MSI、及硕泰。

[0029] 进一步的，所述会议软件能够实现高清地远程视频通话的功能。

[0030] 由于开发后的嵌入式高清会议终端包括了多种 X86 硬件平台，能够有效地解决 X86 硬件平台的兼容性问题，性能稳定。

[0031] 以上实施例仅用以说明而非限制本发明的技术方案。 不脱离本发明精神和范围的任何修改或局部替换，均应涵盖在本发明的权利要求范围当中。

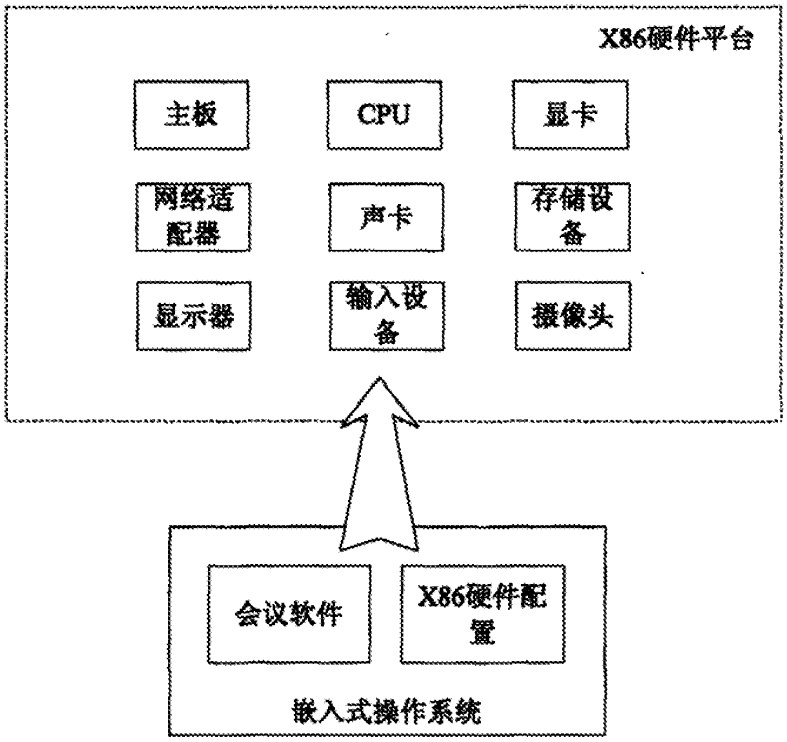

X86硬件平台
主板
CPU
显卡
网络适配器
声卡
存储设备
显示器
输入设备
摄像头
会议软件
X86硬件配置
嵌入式操作系统

图 1

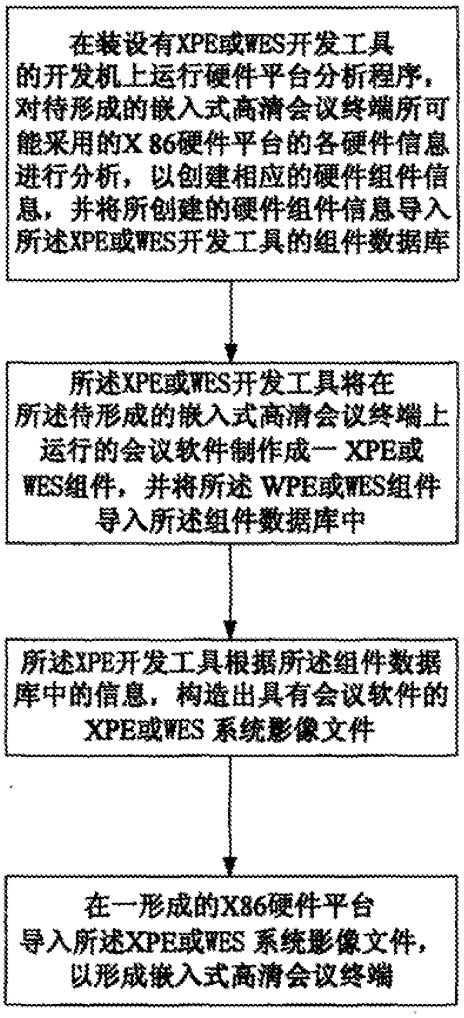

在装设有XPE或WES开发工具的开发机上运行硬件平台分析程序，对待形成的嵌入式高清会议终端所可能采用的X 86硬件平台的各硬件信息进行分析，以创建相应的硬件组件信息，并将所创建的硬件组件信息导入所述XPE或WES开发工具的组件数据库
所述XPE或WES开发工具将在所述待形成的嵌入式高清会议终端上运行的会议软件制作成一 XPE或WES组件，并将所述 WPE或WES组件导入所述组件数据库中
所述XPE开发工具根据所述组件数据库中的信息，构造出具有会议软件的XPE或WES 系统影像文件
在一形成的X86硬件平台导入所述XPE或WES 系统影像文件，以形成嵌入式高清会议终端

图 2

Espacenet

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Method and apparatus for displaying video data from multiple source computers in a multi-monitor computer system

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Abstract of CN101965609 (A)

An apparatus, method and computer program product, for displaying video data from at least one source computer in a multi-monitor computer system, are provided. The apparatus includes a source computer interface for receiving at least video data from at least one source computer, and a multi-monitor interface for providing video data to multiple monitors. A processing structure coordinates routing of video data received via the multi-monitor interface to the monitors based on display requests received from the at least one source computer.

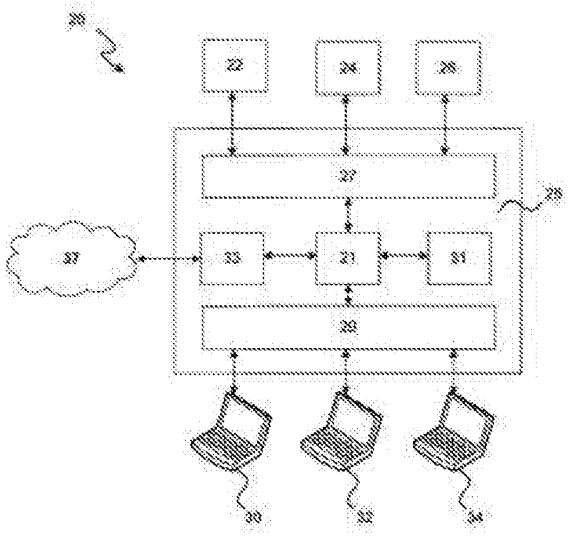


Fig. 1

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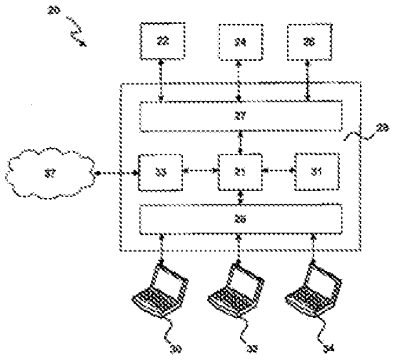
权利要求书 3 页 说明书 12 页 附图 8 页

(54)发明名称

显示来自多监视器计算机系统中的多个源计算机的视频数据的方法和装置

(57)摘要

提供了一种用于显示来自多监视器计算机系统中的至少一个源计算机的视频数据的装置、方法和计算机程序产品。该装置包括用于从至少一个源计算机接收至少视频数据的源计算机接口以及用于向多个监视器提供视频数据的多监视器接口。处理结构基于从至少一个源计算机接收到的显示请求来协调接收到的视频数据经由多监视器接口到监视器的路由。



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1. 一种用于显示来自多监视器计算机系统中的至少一个源计算机的视频数据的装置，包括：

源计算机接口，所述源计算机接口用于从至少一个源计算机接收至少视频数据；

多监视器接口，所述多监视器接口用于向多个监视器提供视频数据；以及

处理结构，所述处理结构基于从所述至少一个源计算机接收到的显示请求来协调视频数据经由所述多监视器接口到所述监视器的路由。

2. 根据权利要求 1 所述的装置，其中，所述源计算机接口包括多个源计算机接口设备，每个源计算机接口设备用于从相应的源计算机接收至少视频数据。

3. 根据权利要求 1 至 2 中的一项所述的装置，其中，所述多监视器接口包括多个监视器接口设备，每个监视器接口设备用于向相应的监视器提供视频数据。

4. 根据权利要求 1 至 3 中的一项所述的装置，进一步包括：

存储设备，所述存储设备用于存储至少视频数据。

5. 根据权利要求 1 至 4 中的一项所述的装置，进一步包括：

网络接口，所述网络接口向远程计算机发送至少视频数据并且从远程计算机接收至少视频数据。

6. 根据权利要求 1 至 5 中的一项所述的装置，其中，所述处理结构将来自每个源计算机的视频数据路由到相应的监视器。

7. 根据权利要求 1 至 6 中的一项所述的装置，其中，所述处理结构响应于接收显示请求来创建用于使所述请求源计算机与被请求的监视器相关联的电子预留记录。

8. 根据权利要求 7 所述的装置，其中，所述处理结构仅在视频数据在请求时没有被路由到被请求的监视器的情况下创建所述电子预留记录。

9. 根据权利要求 7 所述的装置，其中，所述处理结构向提供所述显示请求的所述源计算机通知所述显示请求已经被准许。

10. 根据权利要求 1 至 9 中的一项所述的装置，其中，所述处理结构引起用于手动地准许或拒绝从源计算机接收到的显示请求的管理员界面的显示。

11. 一种显示来自多监视器计算机系统中的至少一个源计算机的视频数据的方法，包括：

从至少一个源计算机接收至少视频数据；以及

基于从所述至少一个源计算机接收到的显示请求来协调所接收到的视频数据到相应的监视器的路由。

12. 根据权利要求 11 所述的方法，进一步包括：

向所述至少一个源计算机提供用于包括在显示请求中的监视器标示符。

13. 根据权利要求 12 所述的方法，其中，所述协调包括：

从请求源计算机接收将其相应的视频数据路由到与所述接收到的监视器标识符相对应的被请求的监视器的包括监视器标识符的显示请求。

14. 根据权利要求 13 所述的方法，进一步包括：

在视频数据已经被路由到所述被请求的监视器的情况下拒绝所述显示请求。

15. 根据权利要求 12 所述的方法，进一步包括：

创建用于使所述请求源计算机与所述被请求的监视器相关联的电子预留记录。

16. 根据权利要求 12 所述的方法，进一步包括：

在所述被请求的监视器已经与源计算机相关联的情况下，创建用于使所述请求源计算机与替选监视器相关联的电子预留记录。

17. 根据权利要求 15 至 16 中的一项所述的方法，其中，根据所述电子预留记录来协调所述路由。

18. 根据权利要求 12 至 17 中的一项所述的方法，进一步包括：

与相应的监视器标识符相关联地向所述至少一个源计算机提供监视器可用性数据，以指示视频数据是否已经被路由到所述监视器。

19. 根据权利要求 11 至 18 所述的方法，进一步包括：

在视频数据已经被路由到所有的所述监视器的情况下，对显示请求进行排队。

20. 根据权利要求 11 至 19 中的一项所述的方法，进一步包括：

引起用于手动地准许或拒绝从源计算机接收到的显示请求的管理员界面的显示。

21. 一种包含计算机程序的计算机可读介质，所述计算机程序用于显示来自多监视器计算机系统中的至少一个源计算机的视频数据，所述计算机程序包括：

从至少一个源计算机接收至少视频数据的程序代码；以及

基于从所述至少一个源计算机接收到的显示请求来协调所接收到的视频数据到多个监视器的路由的程序代码。

22. 一种包括多个监视器的系统，所述多个监视器在操作上与至少一个计算设备相关联，所述至少一个计算设备用于从至少一个源计算机接收至少视频数据并且执行显示管理程序，所述显示管理程序基于从所述至少一个源计算机接收到的显示请求来协调所接收到的视频数据到相应的各个监视器的路由。

23. 根据权利要求 22 所述的系统，其中，所述显示管理程序向所述至少一个源计算机提供每个监视器所特有的监视器标识符，以供由相应的用户进行选择，从而将其包括在显示请求中。

24. 根据权利要求 22 所述的系统，其中，在被请求的监视器还没有与另一源计算机相关联的情况下，所述显示管理程序响应于接收到显示请求来创建使请求源计算机与所述被请求的监视器相关联的电子预留记录。

25. 根据权利要求 22 至 24 中的一项所述的系统，其中，所述显示管理程序呈现用户界面，所述用户界面用于使得所述至少一个计算设备的用户能够查看和准许从所述源计算机接收到的显示请求。

26. 根据权利要求 23 至 24 所述的系统，其中，在请求源计算机提供了包括用于已经与另一源计算机相关联的被请求的监视器的监视器标识符的显示请求的情况下，所述显示管理程序拒绝所述显示请求。

27. 根据权利要求 23 所述的系统，其中，在请求源计算机提供了包括用于已经与另一源计算机相关联的被请求的监视器的监视器标识符的显示请求的情况下，所述显示管理程序自动地使所述被请求的监视器与所述另一源计算机分离，并且使所述被请求的监视器与所述请求源计算机相关联。

28. 根据权利要求 27 所述的系统，其中，所述显示管理程序自动地使所分离的另一源计算机与替选监视器相关联。

29. 根据权利要求 23 至 28 所述的系统，其中，使得每个源计算机显示表示每个监视器的用户可选择的图标。

30. 根据利要求 29 所述的系统，其中，使得每个源计算机与每个监视器的图标相关联地显示用于每个监视器的可用性消息。

31. 根据权利要求 29 所述的系统，其中，在相应的监视器与源计算机相关联的情况下，每个可用性消息包括标识当前正在使用所述监视器的所述源计算设备的信息。

32. 根据权利要求 22 至 31 所述的系统，进一步包括存储器，所述存储器用于存储从所述至少一个源计算机中的一个或多个接收到的至少视频数据。

33. 根据权利要求 22 至 31 所述的系统，其中，所述显示管理程序将显示请求的队列存储在所述存储器中。

34. 根据权利要求 33 所述的系统，其中，所述管理员界面使得用户能够调整存储在所述队列中的显示请求，从而使源计算机与可用监视器相关联。

显示来自多监视器计算机系统中的多个源计算机的视频数据的方法和装置

技术领域

[0001] 下文一般地涉及多监视器计算机系统，并且具体地，涉及用于显示来自多监视器计算机系统中的可能多个源计算机的视频数据的装置、方法和计算机程序产品。

背景技术

[0002] 使用物理显示器设备来便利会议变得越来越流行。根据环境，物理显示器设备可以是许多类型（例如，液晶显示器 (LCD)、阴极射线管 (CRT)、交互式白板 (IWB) 或其它显示器面板等）和 / 或不同尺寸中的一个。通常，从诸如个人计算机等的单个计算设备中的视频卡向物理显示器设备提供视频数据，并且将该物理显示器设备置于在会议室中，以便于对所有的会议参加者都可见。这样的物理显示器设备用于呈现幻灯片、视频数据、照片、图表等以在演讲期间进行使用或者用于讨论。在具有多个贡献者的会议室中，可以使用多个物理显示器设备，并且以一对一的方式将每一个连接到参与者各自的计算设备。

[0003] 多监视器计算机系统包括连接到单个计算设备的多个物理显示器设备。多监视器计算机系统针对计算机程序提供增加的显示区域，并且变得越来越流行。为了支持多个物理显示器设备，许多个人计算机中的视频卡具有多个插孔，以接纳来自多于一个的物理显示器设备的电缆。替选地，一些个人计算机具有多个视频卡以接纳来自多于一个的物理显示器设备的电缆。在任何一种情况下，响应于执行一个或多个计算机程序而由计算设备的视频卡生成的视频数据都被输出到物理显示器设备以进行显示。其它多监视器计算机系统具有联网的物理显示器设备，其中，物理显示器设备经由无线或有线网络来进行连接，并且经由该网络连接来向物理显示器设备提供视频数据以进行显示。

[0004] 在会议期间常常期望在单个物理显示器设备上呈现来自多个源计算设备的视频数据。这通常通过以物理方式从一个源计算设备拔出物理显示器设备中的一个的电缆并将其插入另一个中来完成。然而，以物理方式交换电缆可能是相当不方便并且耗时的，尤其是在多监视器计算机系统中。此外，以物理方式从源计算设备移除电缆使得不可能将其视频数据连同另一个的视频数据同时显示在同一物理显示器设备上。

[0005] 如将认识到的，期望改善来自多监视器计算机系统中的多个计算设备的视频数据的显示。因此，本发明的目的至少在于提供一种用于显示来自多监视器计算机系统的多个源计算机的视频数据的新颖的方法以及采用该方法的新颖的装置。

发明内容

[0006] 根据一方面，提供了一种用于显示来自多监视器计算机系统中的至少一个源计算机的视频数据的装置，包括：

[0007] 源计算机接口，该源计算机接口用于从至少一个源计算机接收至少视频数据；

[0008] 多监视器接口，该多监视器接口用于向多个监视器提供视频数据；以及

[0009] 处理结构，该处理结构基于从至少一个源计算机接收到的显示请求来协调经由多

监视器接口向监视器路由视频数据。

[0010] 根据另一方面，提供了一种显示来自多监视器计算机系统中的至少一个源计算机的视频数据的方法，包括：

[0011] 从至少一个源计算机接收至少视频数据；以及

[0012] 基于从至少一个源计算机接收到的显示请求来协调对相应监视器的接收到的视频数据的路由。

[0013] 根据本发明的另一方面，提供了一种计算机可读介质，该计算机可读介质包含用于显示来自多监视器计算机系统中的至少一个源计算机的视频数据的计算机程序，该计算机程序包括：

[0014] 从至少一个源计算机接收至少视频数据的程序代码；以及

[0015] 基于从所述至少一个源计算机接收到的显示请求来协调对多个监视器的接收到的视频数据的路由的程序代码。

[0016] 根据另一方面，提供了一种系统，该系统包括：多个监视器，该多个监视器在操作上与至少一个计算设备相关联，该至少一个计算设备用于从至少一个源计算机接收至少视频数据并且执行显示管理程序，该显示管理程序基于从所述至少一个源计算机接收到的显示请求来协调对相应的各个监视器的接收到的视频数据的路由。

[0017] 本发明的装置、方法、计算机可读介质和系统支持在多个监视器上的对来自至少一个源计算机的视频数据的显示的集中式协调，至少减少对于插入和拔出物理电缆的需要，并且基本上使得在多个监视器上显示和协调来自一个或多个源计算机的视频数据的过程变得容易。

附图说明

[0018] 现在将参考附图来更全面地描述实施例，在附图中：

[0019] 图 1 是多监视器计算机系统的示意性表示；

[0020] 图 2 示出了部署在会议室中并且包括连接到单个中央计算机的多个交互式白板和多个膝上型源计算机的多监视器计算机系统；

[0021] 图 3 示出了图 2 的交互式白板和两个膝上型计算机，来自两个膝上型计算机的视频数据被路由以在相应的各个交互式白板上进行显示；

[0022] 图 4a 是在与在中央计算机上运行的主机显示管理程序进行交互的相应的源计算机上运行的客户端显示管理程序的示意性表示；

[0023] 图 4b 是示出用于共享视频数据的步骤的流程图；

[0024] 图 5A 至图 5B 示出了用于创建请求源计算机与监视器之间的关联并且用于在监视器上显示来自请求源计算机的视频数据的过程的流程图；

[0025] 图 6 是使得在源计算机处显示的用于选择期望在其上显示视频数据的监视器的对话框的图示；以及

[0026] 图 7 是示出用于从源计算机向相关监视器提供视频数据的过程的流程图。

具体实施方式

[0027] 现在转到图 1，示出了多监视器计算机系统，并且通常用附图标记 20 来标识该多

监视器计算机系统。如可以看到的，在该实施例中，多监视器计算机系统包括多个物理显示器设备 22、24、26，其中的每一个都连接到公共计算设备，在该情况下为中央计算机 28。物理显示器设备 22、24、26 可以采取多种形式。例如，物理显示器设备可以是相同类型或不同类型的监视器（例如，液晶显示器 (LCD)、阴极射线管 (CRT)、等离子显示器设备或其它类型的显示器面板）和 / 或可以具有相同或不同的分辨率。替选地，物理显示器设备 22、24、26 可以是交互式白板 (IWB)。每个 IWB 可以是许多类型中的一个，该类型包括但不限于，模拟电阻式、电容式、基于照相机、电磁性、表面声波等。当然，物理显示器设备 22、24、26 可以是监视器与 IWB 的组合。一个或多个其它计算设备也与中央计算机 28 进行通信。在该实施例中，示出了与中央计算机 28 进行通信的三 (3) 个膝上型计算机 30、32、34。膝上型计算机 30、32、34 可以通过诸如以太网或通用串行总线 (USB) 连接的有线通信链路来与中央计算机 28 进行通信，或者可以通过诸如射频 (RF) 或蓝牙 TM 连接的无线通信链路来与中央计算机 28 进行通信。出于本申请的目的，将可互换地使用“监视器”和“物理显示器设备”来引用上文所阐述的监视器、IWB、或任何其它这样的物理显示器设备中的任何一个。

[0028] 如在以下段落中将更详细描述的，如将要描述的，中央计算机 28 被布置或编程为显示来自多监视器计算机系统中的多个源膝上型计算机 30、32、34 的视频数据。中央计算机 28 包括用于从多个源计算机 30、32、34 接收视频数据的源计算机接口 29。根据实现，源计算机接口 29 可以是用于处理与源计算机 30、32、34 的有线和 / 或无线通信链路的单个设备，或者包括一组源计算机接口设备，其中的每个都处理与源计算机 30、32、34 中的相应一个的通信。中央计算机 28 还包括用于向监视器 22、24 和 26 提供视频数据的多监视器接口 27。根据实现，多监视器计算机接口 27 可以是用于处理与监视器 22、24 和 26 的有线和 / 或无线通信链路的单个设备，或者包括一组监视器接口设备，其中的每一个都处理与监视器 22、24、26 中的相应一个的通信。

[0029] 中央计算机 28 包括处理器 21，该处理器 21 根据存储在非易失性存储器 31 中并且在系统存储器中执行的软件的指令，基于来自源计算机 30、32、34 的请求来协调将接收到的视频数据经由多监视器接口 27 提供给监视器 22、24、26。

[0030] 除存储用于协调多监视器计算机系统 20 的软件之外，存储器 31 还存储用户可调整的和非用户可调整的配置参数以在协调期间进行使用。根据需要，存储器 31 还被配置为存储用于可选屏幕捕捉及其它目的的视频数据，诸如用于在源计算机 30、32、34 和中央计算机 28 之间的文件共享和传送。同样出于该目的，可以将外部存储器设备（未示出）连接到中央计算机 28。

[0031] 中央计算机 28 还包括与中央计算机 28 的其它组件互连的网络接口 33，用于经由网络 37 发送和接收视频数据并且处理来自远程源计算机（未示出）的显示请求。还可以使用网络接口 33 来提供对另一存储器设备（未示出）的访问。可以通过因特网、虚拟专用网络 (VPN) 或类似通信链路经由窗口共享软件来进行与其它远程源计算机的通信。窗口共享软件可以是多种类型中的一个，诸如由本申请的受让人，加拿大亚伯达省卡尔加里市的 SMART 技术有限公司提供的类型，名为 SynchronEyes™、Bridgit™ 或 LinQ™，或者由第三方提供的类型，名为 WebEx™、Microsoft Remote Desktop、Netmeeting、Windows Live™ 或 VNC™。

[0032] 图 2 和图 3 示出了多监视器计算机系统 20，该多监视器计算机系统 20 被部署在会

议室中并且具有物理显示器设备 22 至 26，物理显示器设备 22 至 26 采取在不同的间隔位置处安装在会议室的墙壁上的交互式白板 (IWB) 的形式。经由安装在中央计算机 28 中的视频卡的相应插孔所接纳的电缆或者经由网络连接来将每个 IWB 连接到中央计算机 28（未示出）。该配置中的膝上型计算机 30 至 34 经由无线通信链路来与中央计算机 28 进行通信。替选地，每个 IWB 可以包括嵌入式处理单元，该嵌入式处理单元控制其显示器，并且直接从膝上型计算机 30 至 34 中的一个或多个接收通信。

[0033] 在该实施例中，IWB 22 和 24 是由本申请的受让人、加拿大亚伯达省卡尔加里市的 SMART 技术有限公司制造的 6001 系列交互式白板。如可以看到的，每个 IWB 22、24 包括具有触摸表面 72 的模拟电阻式触摸屏 70。触摸表面 72 被边框 74 包围。工具托盘 76 被附连到与触摸表面 72 的底部边缘邻近的边框 74，并且容纳用于与触摸表面 72 进行交互的一个或多个工具。

[0034] 悬臂 (boom) 组件 82 经由安装支架 84 被安装在触摸屏 70 之上。悬臂组件 82 包括从安装支架 84 向外延伸并且支撑邻近其远端处的投影仪 88 的大体水平的悬臂 86。投影仪 88 指向触摸屏 70，使得由投影仪 88 投射的图像被呈现在触摸表面 72 上。

[0035] 在每个 IWB 22、24 的操作期间，投影仪 88 接收来自中央计算机 28 的视频输出，并且将该视频图像投射到触摸表面 72 上。该视频图像可以是中央计算机 28 的桌面或膝上型计算机 30 至 34 中的一个的桌面。当用户用诸如手指、笔工具或其它物体的指示器接触触摸表面 72 时，该接触由 IWB 来检测，并且触摸屏 (x，y) 坐标的接触位置被传送到中央计算机 28。作为响应，中央计算机 28 将触摸屏 (x，y) 坐标映射成计算机显示器坐标，并且处理该得到的输入。根据得到的输入的性质，可以将触摸表面接触处理为写入或绘画 (draw) 或作为鼠标事件。因此，触摸表面 72 上的指示器接触或跨越接触表面 72 的指示器移动可以由中央计算机 28 记录为写入或绘画，或者用于控制加载在中央计算机 28 上的一个或多个应用程序的执行。中央计算机 28 还更新被传送到投影仪 88 的视频输出，使得在触摸表面 72 上呈现的视频图像反映指示器活动。

[0036] IWB 26 是由本申请的受让人、加拿大亚伯达省卡尔加里市的 SMART 技术有限公司制造的 DViT 基于照相机的交互式白板，并类似于美国专利 No. 6, 803, 906 ；No. 6, 972, 401 ；和 No. 7, 236, 162 中所述的那些，其全部内容通过引用并入本文中。IWB 26 包括包围诸如等离子体显示器或 LCD 的投影设备的显示屏的矩形边框或框架 100。将工具托盘 102 附连到边框 100，并且容纳用于与投影设备进行交互的一个或多个笔工具。投影设备接收来自中央计算机 28 的视频输出，并且在其显示屏 106 上显示视频图像。邻近边框 100 的至少两个角来提供数字照相机 104。数字照相机 104 具有包容显示屏 106 并且扫视显示屏 106 的重叠视野。

[0037] 在操作期间，数字照相机 104 从不同视点获取大体上扫视显示屏 106 的图像并且生成图像数据。由数字照相机 104 获取的图像数据由机载 (on-board) 数字信号处理器来处理，以确定在捕捉到的图像数据中是否存在指示器。当确定了在捕捉到的图像数据中存在指示器时，数字信号处理器生成指示器信息分组 (PIP) 并且将该 PIP 传送到主控制器。在接收到 PIP 时，主控制器使用三角测量法来处理该 PIP，以确定捕捉到的图像中的指示器相对于显示屏 (x，y) 坐标的位置。以该方式，在响应于捕捉到的图像来生成 PIP 时，可以将投影设备的显示屏 106 转换 (turn) 为交互式触摸表面来跟踪指示器在显示屏 106 上的位

置和移动。由主控制器生成的显示屏 (x,y) 坐标被传送到中央计算机 28。类似地,作为响应,中央计算机 28 将显示屏 (x, y) 坐标映射成计算机显示器坐标并且处理该得到的输入。根据得到的输入的性质,可以将显示屏 106 接触处理为写入或绘画或作为鼠标事件。因此,显示屏 106 上的指示器接触或跨越显示屏 106 的指示器移动可以由中央计算机 28 记录为写入或绘画,或用于控制加载在中央计算机 28 上的一个或多个应用程序的执行。中央计算机 28 还更新传送到投影设备的视频输出,使得在其触摸屏 106 上呈现的视频图像反映指示器活动。

[0038] 图 4A 示出了执行显示管理程序的多监视器计算机系统 20 的软件结构。每个源计算机 30、32、34 都运行客户端显示管理程序 112,其能够与在中央计算机 28 上运行的主机显示管理程序 114 进行通信。客户端显示管理程序 112 将由源计算机 30 的用户发起的视频数据显示请求传递到中央计算机 28 处的主机显示管理程序 114。如将描述的,一旦显示请求自动地或通过其用户 (通常为会议主持人或管理员) 被主机显示管理程序 114 准许,客户端显示管理程序 112 就还处理对主机显示管理程序 114 的视频数据的发送。

[0039] 根据实施例,主机显示管理程序 114 对源计算机 30、32、34 进行轮询,以确定其是否准备好提供或共享视频数据。主机显示管理程序 114 结合用户输入或自动地进行关于是否准许显示请求以及关于视频数据将被路由到哪个监视器的确定。主机显示管理程序 114 向在相应源计算机 30、32、34 上运行的客户端显示管理程序 112 发送准许 / 拒绝 / 等待消息,以指示相应的显示请求已经被允许、拒绝或由于监视器的目前不可用而导致正在排队。根据该实施例,还在源计算机 30、32 或 34 与中央计算机 28 之间交换其它信息,例如,监视器标识符、包括哪个源计算机当前与特定监视器相关联的监视器可用性消息、监视器 22、24、26 和源计算机 30、32、34 的可用屏幕分辨率。

[0040] 图 4b 是示出用于如由源计算机 30、32、34 中的一个的用户发起的用于共享视频数据并且从而向中央计算机 28 提供视频数据的步骤的流程图 120。使用在源计算机 30 上运行的客户端显示管理程序 112 的接口,源计算机 30 的用户选择共享视频数据 (步骤 122)。基于该选择,由在源计算机 30 上运行的客户端显示管理程序 112 将显示请求提供给在中央计算机 28 上运行的主机显示管理程序 114。从而向中央计算机 28 通知源计算机 30 可用于提供用于在监视器 22、24、26 中的一个上进行显示的视频数据。然后,中央计算机 28 决定是否准许该显示请求 (步骤 124)。

[0041] 为了促进监视器显示请求的协调使用户满意,主机显示管理程序 114 为在相应源计算机 22、24、26 上运行的每个客户端显示管理程序 112 提供监视器标识符。每个监视器标识符独特地标识中央计算机 28 针对其协调视频数据的路由的监视器 30、32、34。然后,源计算机 30、32、34 可以向其相应的用户呈现监视器标识符以有助于选择用于显示的监视器,并且由用户发起的显示请求因此可以包括与用户的选择相对应的监视器标识符。如将结合图 6 讨论的,主机显示管理程序 114 还与相应的监视器标识符相关联地提供哪些监视器 30、32、34 已经与源计算机相关联的可用性消息指示。

[0042] 图 5a 和图 5b 示出了用于基于在中央计算机 28 处从源计算机 30 接收到的显示请求 (步骤 210) 来向监视器 22、24、26 中的一个共享源计算机 30 的视频数据的过程 200 的流程图。如果显示请求包括标识源计算机 30 的用户想要向其发送视频数据的特定监视器的监视器标识符 (步骤 212),则进行检查以确定特定被请求的监视器是否已经与另一源计

算机（在该情况下，为源计算机 32 或 34）相关联（或者“被共享到另一源计算机”）。这将是在特定被请求的监视器实际上正在显示另一源计算机的视频数据（步骤 214）时，或者在已经建立了关联并且被请求的监视器上的视频数据的显示即将发生时的情况。如果特定被请求的监视器还没有被共享到另一源计算机，则被请求的监视器由中央计算机 28 预留用于请求源计算机 30（步骤 216）。更特别地，创建使源计算机 30 与被请求的监视器相关联的存储器 31 中的电子预留记录。

[0043] 一旦已经以该方式建立了关联，则向请求源计算机 30 通知该预留（步骤 234）。一旦已被通知了该预留，请求源计算机 30 生成并且向中央计算机 28 发送用于在预留的监视器 22 上显示视频数据的指令。

[0044] 然后，将用于在预留的监视器上显示视频数据的指令与存储器 31 中的预留记录作比较，以确保源计算机 30 确实被授权在预留的监视器 22 上显示视频数据。然后，进行检查以确定是否需要管理员 / 主持人进行对于显示的进一步许可（步骤 236）。在该实施例中，管理员 / 主持人是中央计算机 28 的用户。在需要进一步的许可的情况下，在中央计算机 28 的本地屏幕（未示出）上为管理员 / 主持人提供作为用户界面的一部分的对话框，并且提供准许或拒绝该预留的机会。还为管理员 / 主持人提供修改电子预留记录或创建新的电子预留记录以实际上使请求源计算机 30 与替选监视器相关联的机会（步骤 242）。如果管理员拒绝该请求，则源计算机 30 接收拒绝监视器共享请求消息，并且不经由中央计算机 28 向被请求的监视器转发视频数据（步骤 244）。如果管理员确认该预留，则由中央计算机 28 根据由源计算机 30 提供的包括显示参数（如果需要）的显示指令来自动地调整预留的监视器的分辨率，并且在源计算机 30 与中央计算机 28 之间建立视频数据传送连接，使得视频数据被提供给预留的监视器来进行显示（步骤 238）。在管理员选择通过使另一可用监视器与请求源计算机 30 相关联来调整预留的情况下，相应地修改电子预留请求，创建新的电子预留请求来替代原始的电子预留请求，或不论电子预留请求如何中央计算机 28 都将视频数据路由到替选监视器（步骤 246），并且然后过程前进到步骤 238。

[0045] 在替选实施例中，主机显示管理程序自动地决定确认还是拒绝该预留，或者将不同的可用监视器指配给请求源计算机 30。在做出决定（例如，在步骤 238 或步骤 244）之后，优选地删除没有指配给源计算机 30 的预留的监视器的电子预留记录。

[0046] 在步骤 214 处，在被请求的监视器当前正在显示视频数据并且因此已经被共享的情况下，在步骤 218 处进行检查以确定是否自动地拒绝新的显示请求。在被请求的监视器当前被共享的情况下，是否自动地拒绝显示请求的决定优选地基于在中央计算机 28 上运行的主机显示管理程序 112 的用户可调整的设置。基于该设置，这时可以拒绝该请求（步骤 220）。否则，进行检查以确定是否可以替换当前共享被请求的监视器的源计算机（步骤 222），使得当前源计算机与被请求的监视器分离，并且使请求源计算机 30 与被请求的监视器相关联。是否自动地替换现有监视器共享的决定优选地基于在中央计算机 28 上运行的主机显示管理程序 114 的用户可调整的设置。

[0047] 在可以替换现有监视器共享的情况下，作出尝试来预留另一可用监视器用于将被替换的源计算机，并且预留被请求的监视器用于请求源计算机 30（步骤 224）。然后，该过程移动到步骤 234，并如上文所述地继续。

[0048] 如果在步骤 222 处，可以不替换被请求的监视器与其当前源计算机之间的现有关

联，则在步骤 226 处进行关于是否存在任何可用监视器的检查。如果没有显示源计算机的视频数据（例如，没有"共享到"源计算机），则认为该监视器可用。在至少一个监视器可用的情况下，基于预留协议来预留可用监视器中的一个用于请求源计算机（步骤 228）。预留协议的细节可以包括诸如基于请求源计算机所连接（如果是有线连接）到的中央计算机 28 中的特定插孔来选择监视器的规则。其它规则诸如由请求源计算机的用户以其选择请求源计算机共享视频数据的顺序、下一个可用监视器所连接（如果是有线连接）到的中央计算机 28 中的特定插孔、监视器以其连接到中央计算机 28 的顺序、或最近监视器使用的顺序。可以采用其它这样的规则或规则的协议。

[0049] 然后，向请求源计算机通知该预留（以及被请求的监视器不可用）（步骤 234），并且过程如上所述地继续。在该实例中，对话框弹出以向请求源计算机的用户通知被请求的监视器不可用，但是可以选择一个或多个替选监视器。

[0050] 在步骤 226 处，在不存在可用的监视器的情况下，那么来自请求源计算机的显示请求在存储器 31 中进行排队（步骤 230），直至使用中央计算机 28 的管理员选择该请求并指定用于请求源计算机的监视器预留（步骤 232），或者直至监视器变得可用（步骤 226）。这时，过程随后如上文所述从步骤 228 开始继续。

[0051] 在步骤 212 处，在来自请求源计算机的显示请求不包括监视器标识符的情况下，那么过程在步骤 226 立即继续，以确定是否有任何监视器可用，并且如果是这样，则根据如上所述的协议和主机显示管理程序 114 的设置来自动地或通过管理员 / 主持人选择来选择监视器。

[0052] 图 6 是在中央计算机 28 或在源计算机 30、32、34 处本地地显示的用于选择用于显示视频数据的监视器 22、24、26 的对话框 150 的图示。如上所指示的，该对话框使得用户能够查看与中央计算机 28 与之进行通信的监视器的监视器标识符以及状态和分辨率信息。例如，如图 6 所示，第三监视器 156 当前正在显示 Andy 的源计算机的桌面，并且第一和第二监视器 152 和 154 可用于显示来自中央计算机 28 与之进行通信的其它源计算机的视频数据。

[0053] 图 7 是示出在步骤 238 处用于将视频数据从源计算机 30 提供到相关监视器的过程 300 的流程图。以为源计算机的本地显示准备视频数据相同的方式在源计算机处准备视频数据（步骤 310）。然后，将视频数据处理成适合于通过源计算机 30 与中央计算机 28 之间的有线或无线连接传输到中央计算机 28 的格式（步骤 312）。在实施例中，对视频数据进行压缩和编码，以便于保持视频数据在传输期间的完整性，并且减少发送的视频数据量。然后，处理的视频数据被发送到中央计算机 28（步骤 314），并且被路由到相关监视器来进行显示（步骤 316）。

[0054] 应当理解，完全运行的多监视器计算机系统 20 可以具有同时协调下的许多本地和 / 或远程源计算机 30、32、34 和许多监视器 22、24、26，以便于实时地实现来自多监视器计算机系统 20 中的多个源计算机的视频数据的有用的和同时显示。

[0055] 虽然已经描述了采用单个中央计算机 28 的实施例，但是应当理解，可以将多个这样的计算机 28 互连，以便于提供更大的范围来显示来自多个源的视频数据。例如，可以经由中央计算机 28 之间的对等连接将每个都具有相应的中央计算机 28 的多个会议地点进行互连。这将使得能够经由与在另一会议地点处的会议参与者的对等连接来共享连接到一个

会议地点处的一个中央计算机 28 的源计算机视频数据，反之亦然。为了有助于该范围的系统的协调，可能有用的是，经由配置设置来指定会议室中的一个或多个监视器是“远程”监视器，而其余监视器是“本地的”。这可以通过限制可用于本地源计算机的监视器选择以便于向被预留作为远程的那些监视器提供视频数据来实现。

[0056] 虽然已描述了实施例，由此源计算机的用户能够使用号码或图形用户界面来请求监视器，但可以使用其它方法。例如，可能要求请求源计算机的用户在进行显示请求时预先处理监视器连接代码，以便于根据允许用户在哪些监视器上显示来自其正在操作的源计算机的视频数据来促进安全水平和协调性。某些有资格的用户可以在会议之前接收到其独特的监视器连接代码，使得有资格的用户能够使用其独特的连接代码来向某些监视器提供视频数据，同时防止具有连接到网络的源计算机的其它会议出席人这样做。

[0057] 应当理解，上述发明不限于用膝上型源计算机来进行使用，而是可以用于用作源计算机和 / 或中央计算机 28 的各种类型的便携式计算机，诸如蜂窝式电话、PDA（个人数字助理）或台式计算机。

[0058] 附录 A 是软件代码和关于该软件代码的注释，用于找到包括标识符的主机（中央）计算机的监视器信息，向远程（源）客户端发送主机的监视器信息，并且针对要在其上显示的监视器来提示远程（源）客户端，以在如上所述的识别监视器期间进行使用。

[0059] 用于显示来自多监视器计算机系统中的多个源计算机的视频数据的上述装置和所述方法可以包括或者完全或部分地由程序模块来实现，程序模块包括但不限于例程、程序、对象组件、数据结构等，并且可以被实现为存储在计算机可读介质上的计算机可读程序代码。计算机可读介质是能够存储随后可以由计算机系统读取的数据的任何数据存储设备。计算机可读介质的示例包括，例如，只读存储器、随机存取存储器、USB 密钥、闪速存储器（诸如 SD 卡）、CD-ROM、磁带和光学数据存储设备。计算机可读程序代码还可以分布在包括耦接的计算机系统的网络上，使得以分布式方式存储和执行计算机可读程序代码。

[0060] 虽然本文所述的实施例包括发起对中央计算机 28 的显示请求的提供的源计算机，但可以有替换方案。例如，中央计算机 28 可以发起针对源计算机 30、32、34 的“共享”状态的其硬件连接的周期性轮询作为一种形式的显示请求，指示一个或多个源计算机可用于提供视频数据。

[0061] 虽然上文已经描述了特定实施例，但本领域的技术人员应当认识到，在不脱离所附权利要求所限定的本发明的精神和范围的情况下可以进行修改和变更。

[0062] 附录 A

[0063] 1.）找到主机计算机的监视器信息

[0064] 以下监视器代码可在下列各项处获得：

[0065] svn://calsvn0/LinQ/trunk/Source/libSharedData/MonitorData.cpp

[0066] svn://calsvn0/LinQ/trunk/Source/libSharedData/MonitorData.h

[0067] 使用枚举函数来检索关于系统上的不同显示器的信息

[0068] HDC hdcScreen = ::GetDC(0)；

[0069] EnumDisplayMonitors(hdcScreen,NULL,MonitorEnumProc,

[0070] (LPARAM)this)；

[0071] ::ReleaseDC(0,hdcScreen)；

[0072] 枚举函数如下：

[0073] // 枚举函数最初由 Dan Mitchell 写出，作为 Bridgit 会议软件的一

[0074] // 部分

[0075] BOOL CALLBACK MonitorEnumProc(HMONITOR hmon,HDC hdcmon,

[0076] LPRECT rectmon,LPARAM lparam)

[0077] {

[0078] CMonitorData*pData = (CMonitorData*)lparam ;

[0079] MONITORINFOEX mix ;

[0080] mix.cbSize = sizeof(mix) ;

[0081] int iMonitor = pData- > GetMonitorCount() ;

[0082] int iDepth = GetDeviceCaps(hdcmon,BITSPIXEL) ;

[0083] iDepth* = GetDeviceCaps(hdcmon,PLANES) ;

[0084] GetMonitorInfo(hmon,(MONITORINFO*)&mix) ;

[0085] // 使用已经在阵列（它是静态定义的阵列）中的数据结构。

[0086] // 在当其已经锁定其桌面时具有读取颜色深度的问题的情况下使

[0087] // 用现有值（而不是创建整个新 sMONITOR 结构）。

[0088] IMonitorModel::sMONITOR monNew = pData-

[0089] > GetMonitorByIndexUnchecked(iMonitor) ;

[0090] monNew.rcMonitor = mix.rcMonitor ;

[0091] monNew.csName = mix.szDevice ;

[0092] monNew.hMon = hmon ;

[0093] monNew.bPrimary = (mix.dwFlags & MONITORINFOF_PRIMARY) ;

[0094] monNew.iDepth = iDepth ;

[0095] // 如果其已经锁定其桌面，则在 Windows XP 下为此获得 -1，因

[0096] // 为（猜测）对 enumdisplaymonitors 的调用不知何故出现错误。

[0097] // 在该情况下，使用我们有的最后一个值，只要该值是有效的。

[0098] if(monNew.iDepth == -1)

[0099] {

[0100] if(monNew.iLastDepth == -1)

[0101] {

[0102] // 这是非常坏的消息 _ 我们不知道在该情况下该做什么，因此让我

[0103] // 们仅仅猜测 32bpp。

[0104] // 这使得出错的可能性很大，但是 -1 是更严重的错误。

[0105] monNew.iDepth = 32 ;

[0106] }

[0107] monNew.iDepth = monNew.iLastDepth ;

[0108] }

[0109] monNew.iLastDepth = monNew.iDepth ;

[0110] // 现在添加新的监视器

[0111] pData->AddMonitor(monNew);

[0112] return TRUE;

[0113] }

[0114] 2.)向远程客户端发送主机的监视器信息

[0115] 一旦我们具有主机PC的监视器信息,我们就可以将其发送到客户端PC,使得它知道哪些监视器可用。这是我们从主机发送到客户端以概述哪些监视器可用及其尺寸和位置是什么的消息。

[0116] 该文件可在以下处获得:

[0117] svn://calsvn0/LinQ/trunk/Source/libSharedData/message_controller.h

[0118] //

[0119] //CSMsg_ControllerRemoteMonitorSetup等级

[0120] class CSMsg_ControllerRemoteMonitorSetup:public

[0121] CSMsg_Controller

[0122] {

[0123] public:

[0124] CAtlArray<IRemoteMonitorModel::sREMOTEMONITOR>

[0125] m_caMonitors;

[0126] //默认构造函数

[0127] CSMsg_ControllerRemoteMonitorSetup()

[0128] {m_caMonitors.RemoveAll();};

[0129] //外出构造函数

[0130] CSMsg_ControllerRemoteMonitorSetup(CAtlArray<IRemote

[0131] MonitorModel::sREMOTEMONITOR>&caMonitors)

[0132] {m_caMonitors.Append(caMonitors);};

[0133] //进入构造函数

[0134] CSMsg_ControllerRemoteMonitorSetup(CSerializer*pSerial)

[0135] :CSMsg_Controller(pSerial)

[0136] {

[0137] WORD wNumRect = pSerial->GetWord();

[0138] for(int i = 0;i<wNumRect;i++)

[0139] {

[0140] IRemoteMonitorModel::sREMOTEMONITOR mon;

[0141] mon.bPrimary = (bool)pSerial->GetBool();

[0142] mon.bSharing = (bool)pSerial->GetBool();

[0143] CAtlString csString;

[0144] pSerial->GetString(csString);

[0145] mon.csName = csString;

[0146] mon.hMon = (HMONITOR)pSerial->GetDWord();

[0147] mon.iDepth = pSerial->GetDWord();

```
[0148]                mon.iLastDepth = mon.iDepth;
[0149]                POINT ptTopLeft = pSerial->GetPoint();
[0150]                POINT ptBotRight = pSerial->GetPoint();
[0151]                mon.rcMonitor = CRect(ptTopLeft,ptBotRight);
[0152]                m_caMonitors.Add(mon);
[0153]            }
[0154]        };
[0155]        virtual ~CSMsg_ControllerRemoteMonitorSetup(){};
[0156]        virtual CONTROLLERMESSAGES GetControllerMsgType(){return
[0157]    CONTROLLER_REMOTEMONITORSETUP_MSG;};
[0158]        virtual CAtlString ToString()
[0159]        {
[0160]        CAtlString csTemp;
[0161]        CsTemp.Format(_T(" [CSMsg]DontrollerRemoteMonitorSetup::%d
[0162]    monitors]"),m_caMonitors.GetCount());
[0163]        return csTemp+CSMsg_Controller::ToString();
[0164]        }
[0165]    virtual int GetSize()
[0166]    {
[0167]         int rSize = CSMsg_Controller::GetSize()+sizeof(WORD);
[0168]         for(int i = 0;i < (int)m_caMonitors.GetCount();i++)
[0169]         {
[0170]                  rSize+ = sizeof(BYTE);
[0171]                  rSize+ = sizeof(BYTE);
[0172]                  rSize+ =
[0173]    (m_caMonitors[i].csName.GetLength())*sizeof(TCHAR)+sizeof(WORD);
[0174]                  rSize+ = sizeof(DWORD);
[0175]                  rSize+ = sizeof(DWORD);
[0176]                  rSize+ = 8;//2 个点,每点 4 个字节
[0177]        }
[0178]        return rSize;
[0179]    }
[0180]    virtual void Serialize(CBufferSerializer*pSerial)
[0181]    {
[0182]        CSMsg_Controller::Serialize(pSerial);
[0183]        WORD wNumMon = (WORD)m_caMonitors.GetCount();
[0184]        pSerial->PutWord(wNumMon);
[0185]        for(int i = 0;i < wNumMon;i++)
[0186]        {
```

```
[0187]                pSerial->PutByte(m_caMonitors[i].bPrimary);
[0188]                pSerial->PutByte(m_caMonitors[i].bSharing);
[0189]                pSerial->PutString(m_caMonitors[i].csName);
[0190]                pSerial->PutDWord((DWORD)m_caMonitors[i].hMon));
[0191]                pSerial->PutDWord(m_caMonitors[i].iDepth);
[0192]                pSerial->PutPoint(m_caMonitors[i].rcMonitor.TopLeft());
[0193]            pSerial->PutPoint(m_caMonitors[i].rcMonitor.BottomRight());
[0194]        }
[0195]    }
[0196]  };
```

[0197] 每当主计算机上的监视器设置改变时，或者当有人开始或停止共享到监视器时发送该消息。

[0198] 3.）针对要在其上进行显示的监视器提示远程客户端：

[0199] 如果当我们决定进行共享时存在多于一个可用的监视器，则我们：

```
[0200] CMultiMonitorDlg dlg;
[0201] INT_PTR rv = dlg.DoModal();
```

[0202] 其启动多监视器选择对话：

[0203] svn://calsvn0/LinQ/trunk/Source/ZephyrClient/MultiMonitorDlg.cpp

[0204] svn://calsvn0/LinQ/trunk/Source/ZephyrClient/MultiMonitorDlg.h

[0205] 当选择了监视器时，将 HMONITOR 值发送到主机计算机并且在匹配物理显示器上开始观看。

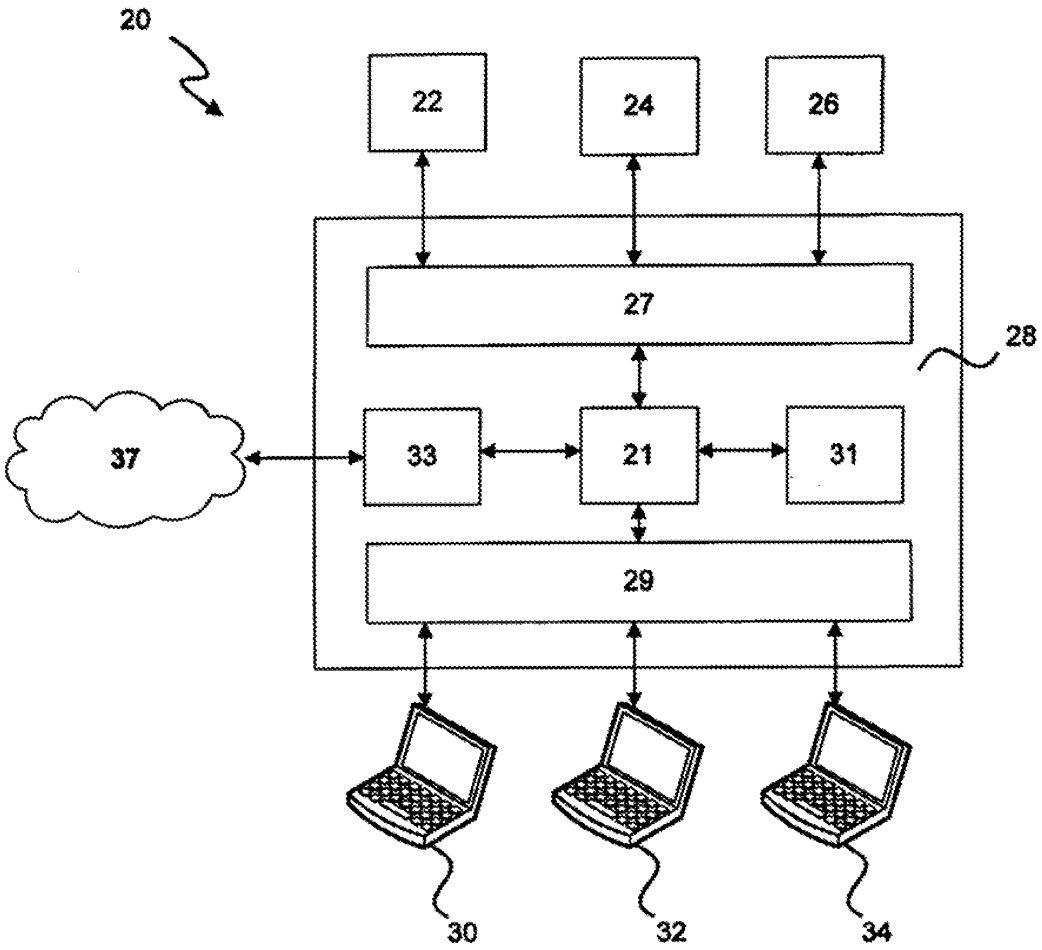


图 1

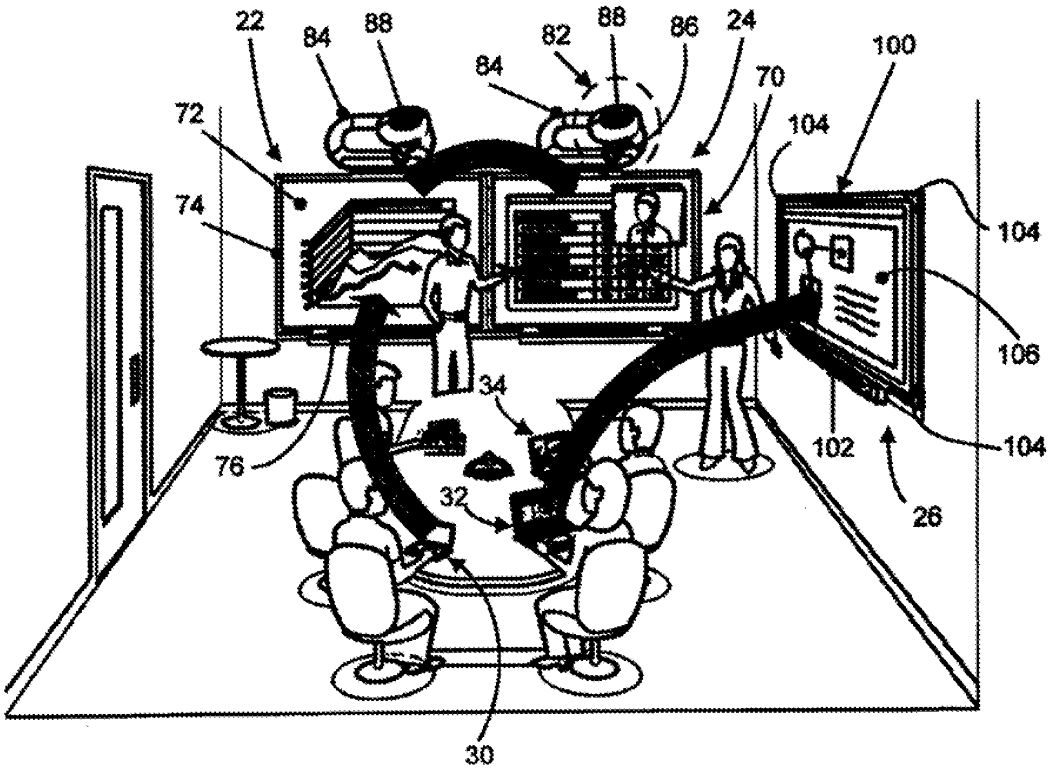

22
84
88
82
88
86
24
84
100
70
72
104
74
104
106
34
76
102
104
32
26
30

图 2

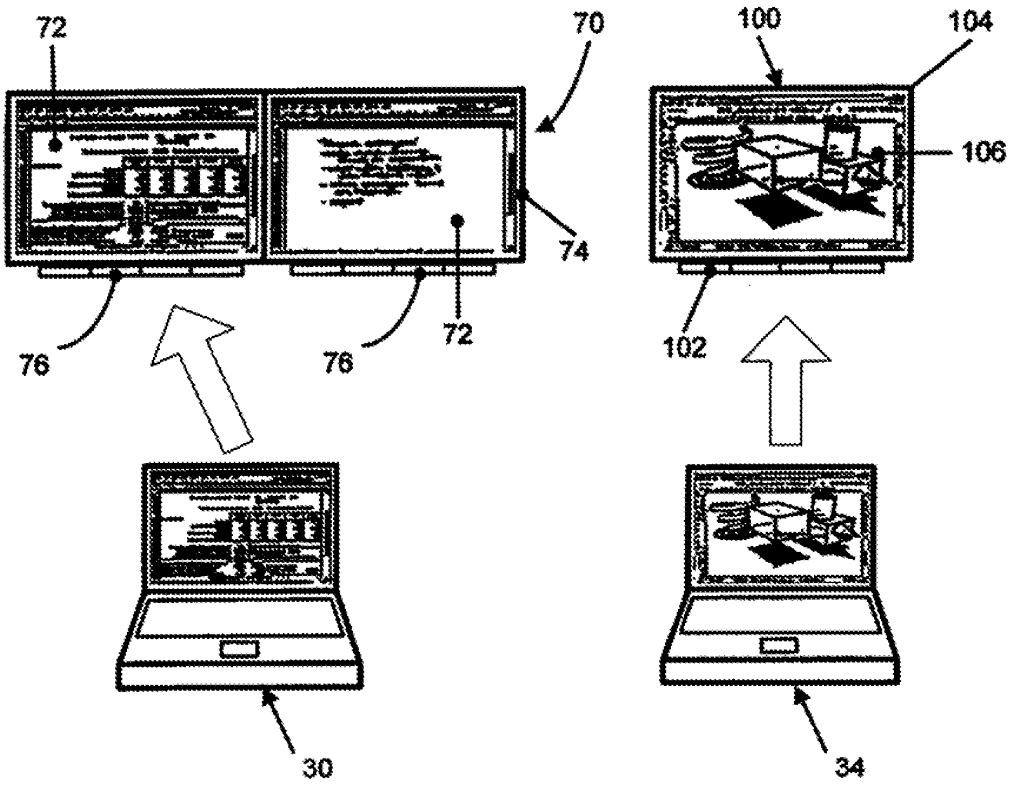

72
70
100
104
106
74
76
72
76
102
30
34

图 3

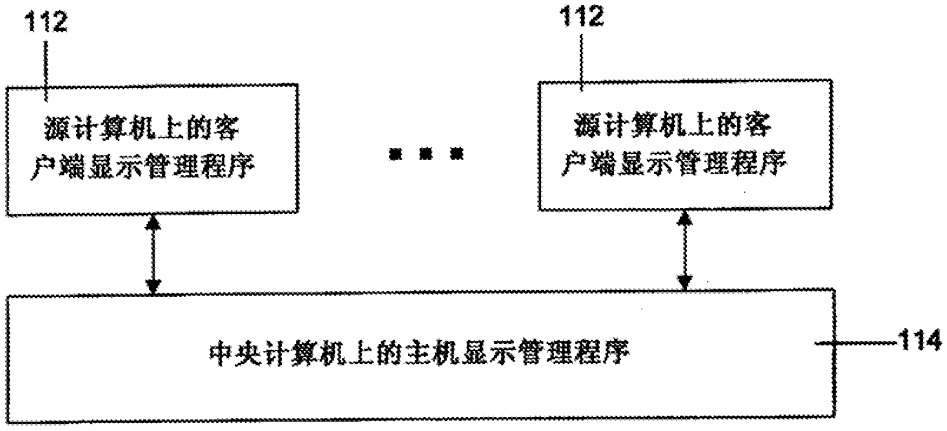

112
112
源计算机上的客户端显示管理程序
源计算机上的客户端显示管理程序
中央计算机上的主机显示管理程序
114

图 4A

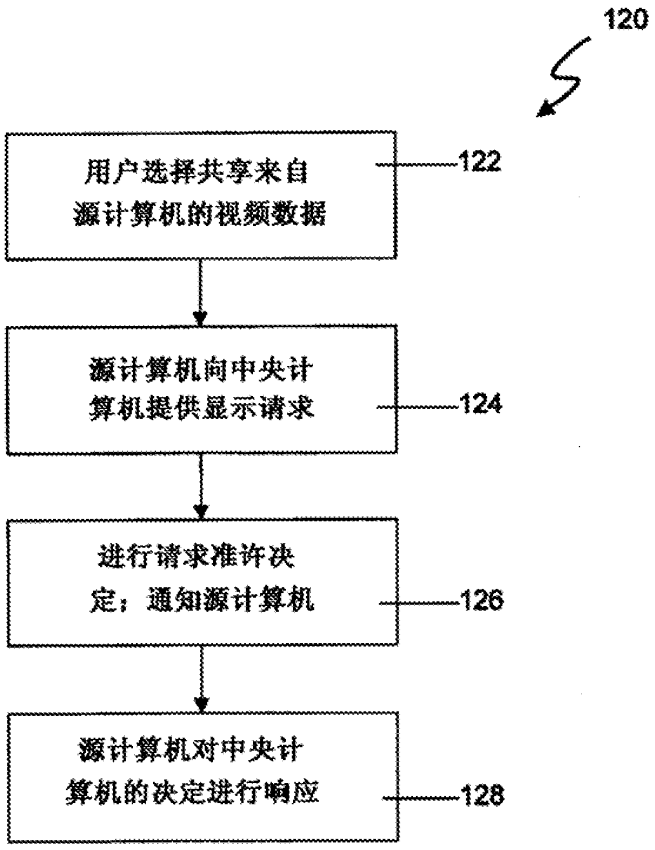

120
用户选择共享来自源计算机的视频数据
122
源计算机向中央计算机提供显示请求
124
进行请求准许决定；通知源计算机
126
源计算机对中央计算机的决定进行响应
128

图 4B

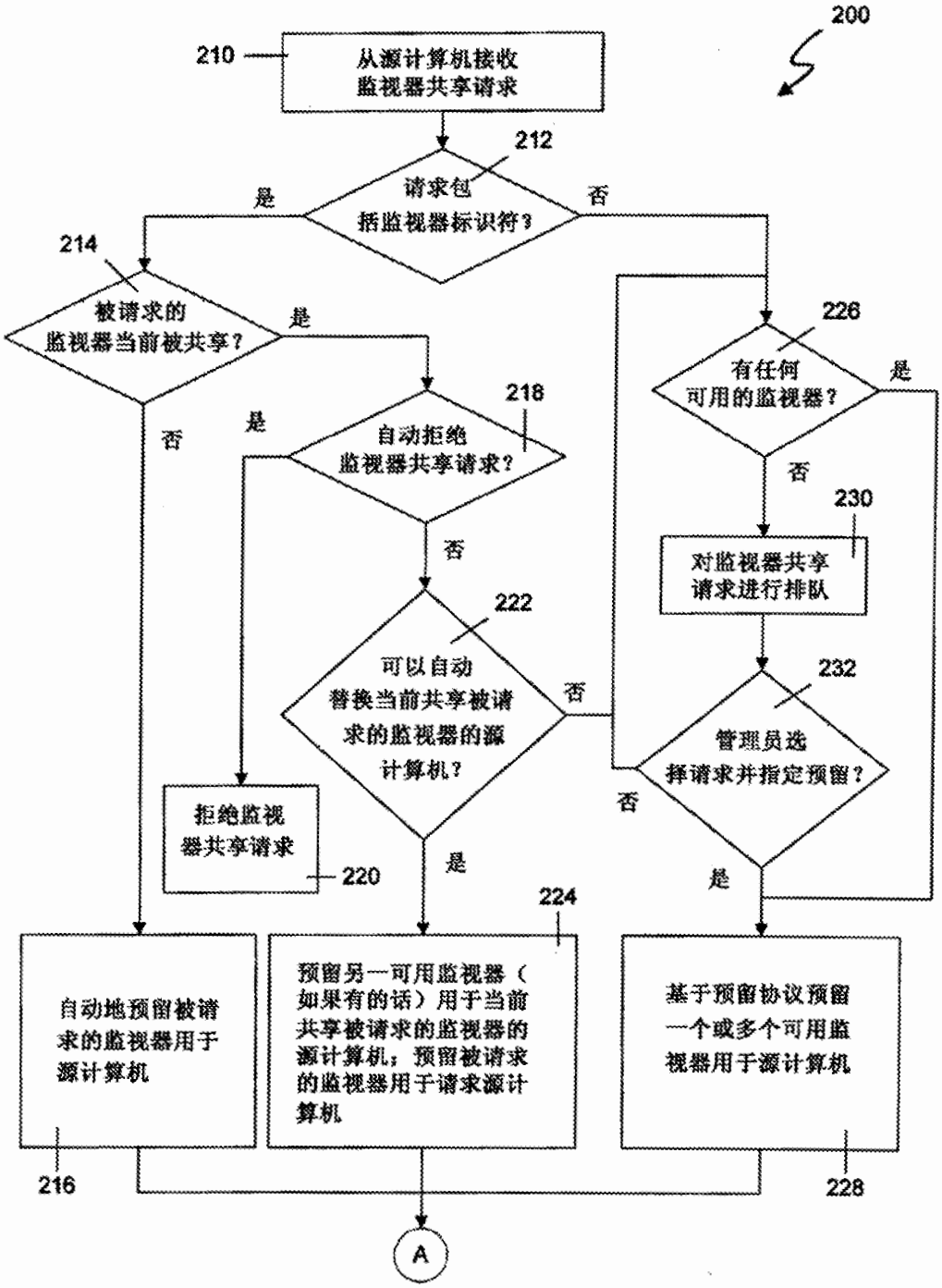

200
210
从源计算机接收监视器共享请求
212
请求包括监视器标识符？
是
否
214
被请求的监视器当前被共享？
是
否
218
自动拒绝监视器共享请求？
是
否
222
可以自动替换当前共享被请求的监视器的源计算机？
否
是
拒绝监视器共享请求
220
224
预留另一可用监视器（如果有的话）用于当前共享被请求的监视器的源计算机；预留被请求的监视器用于请求源计算机
自动地预留被请求的监视器用于源计算机
216
226
有任何可用的监视器？
是
否
230
对监视器共享请求进行排队
232
管理员选择请求并指定预留？
否
是
基于预留协议预留一个或多个可用监视器用于源计算机
228
A

图 5A

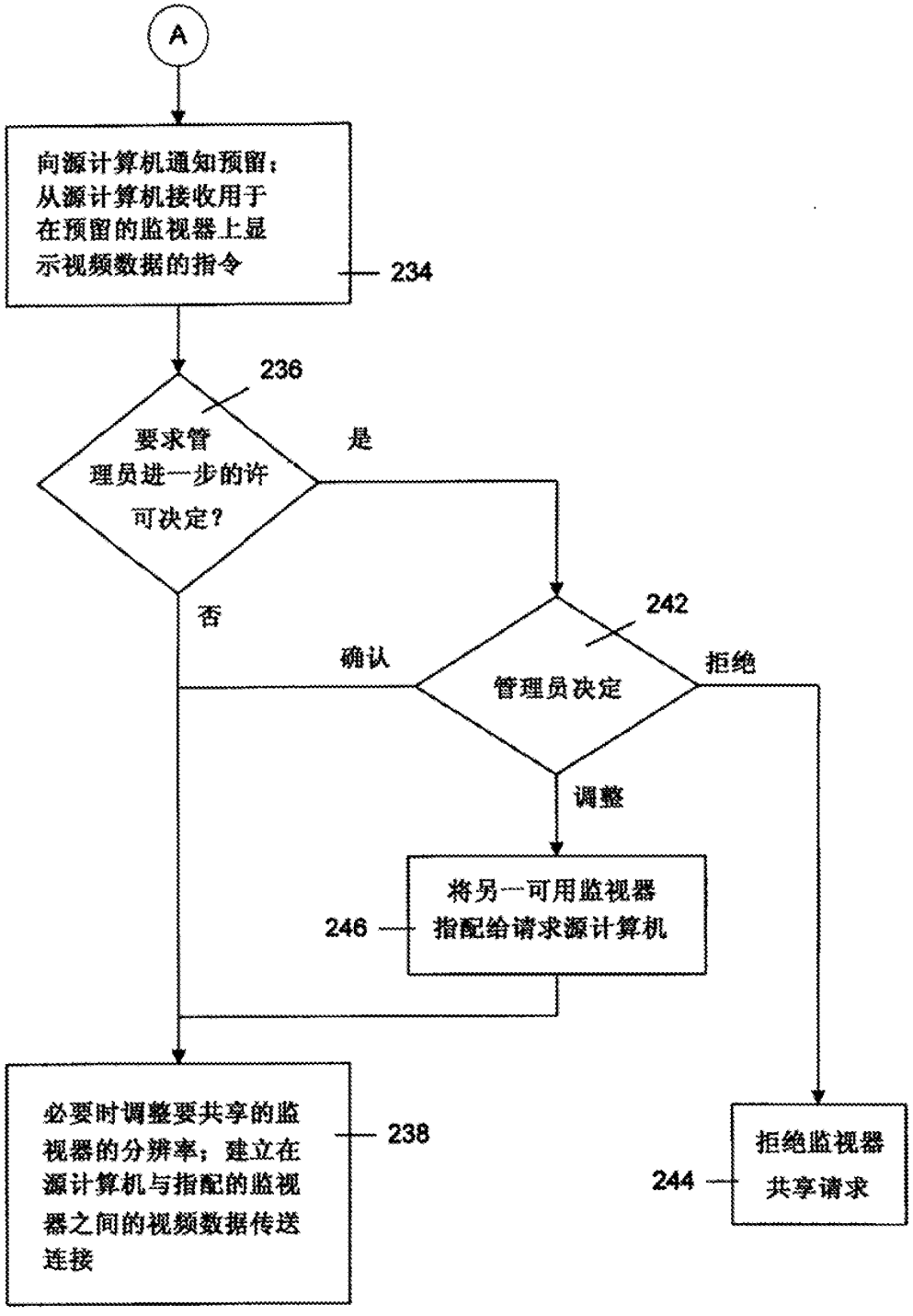

A
向源计算机通知预留；从源计算机接收用于在预留的监视器上显示视频数据的指令
234
236
要求管理员进一步的许可决定？
是
否
242
管理员决定
确认
拒绝
调整
将另一可用监视器指配给请求源计算机
246
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238
拒绝监视器共享请求
244

图 5B

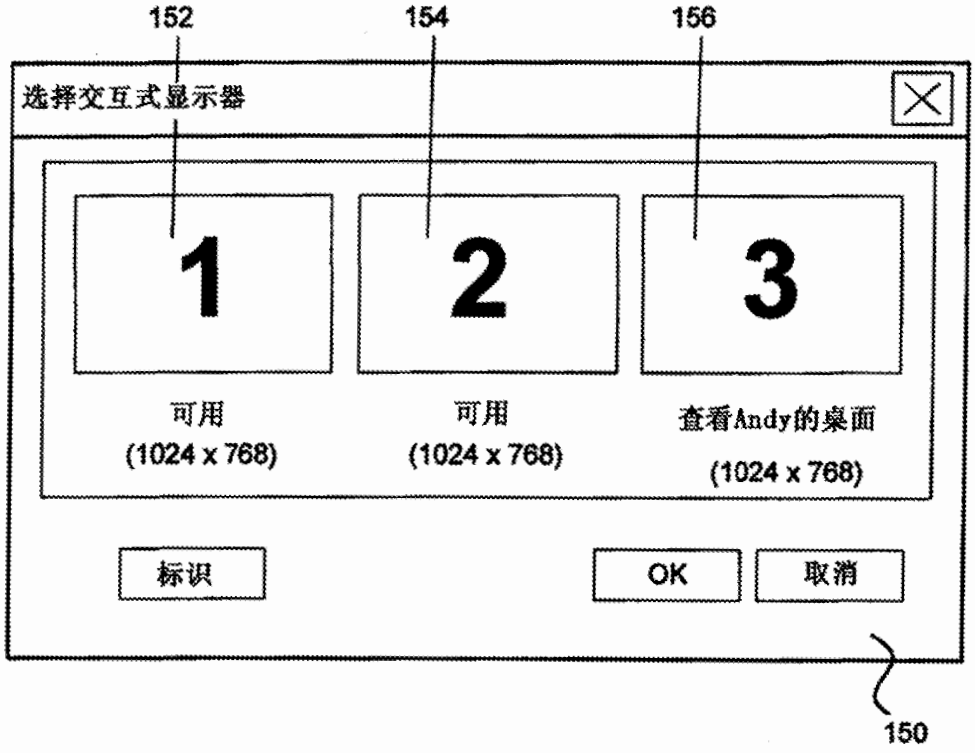

152
154
156
选择交互式显示器
1
2
3
可用
(1024 x 768)
可用
(1024 x 768)
查看Andy的桌面
(1024 x 768)
标识
OK
取消
150

图 6

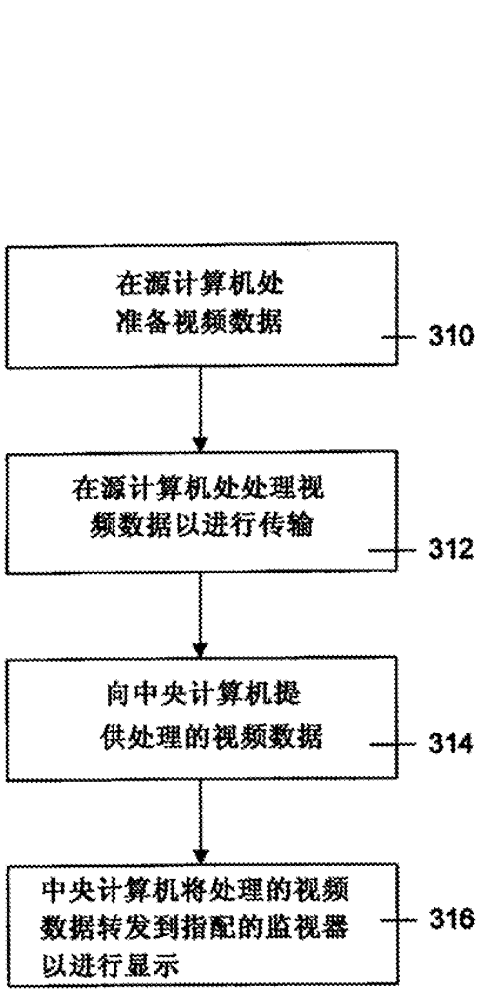

300
在源计算机处
准备视频数据
310
在源计算机处处理视
频数据以进行传输
312
向中央计算机提
供处理的视频数据
314
中央计算机将处理的视频
数据转发到指配的监视器
以进行显示
316

图 7

Espacenet

Bibliographic data: CN102045864 (A) — 2011-05-04

Wireless communication terminal, wireless communication system and recording medium recording computer program

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Applicant(s): NEC CASIO MOBILE COMM LTD ± (NEC CASIO MOBILE COMMUNICATIONS LTD)

Classification: - international: ***H04B17/00; H04M1/725; H04W76/00***
- cooperative: **H04W36/0022**; H04W88/06

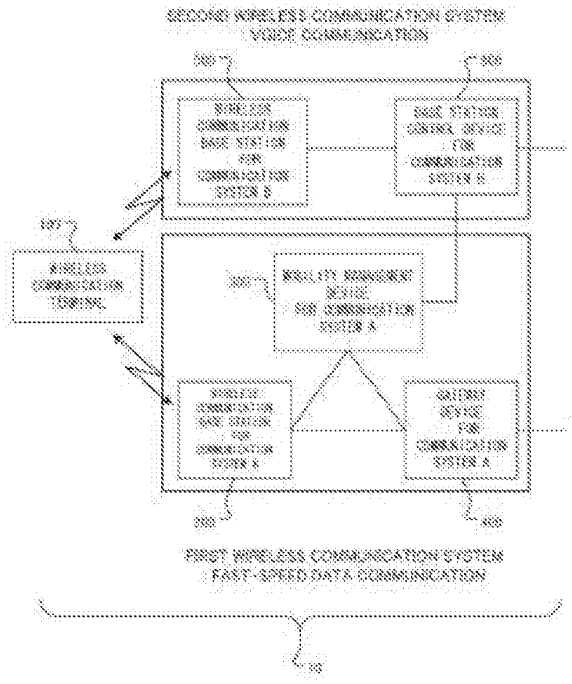
Application number: CN20101528273 20101021 Global Dossier

Priority number(s): JP20090242894 20091021

Also published as: CN102045864 (B) US2011092198 (A1) US8515486 (B2) JP2011091587 (A) JP5403678 (B2)

Abstract of CN102045864 (A)

The present invention provides a wireless communication terminal, a wireless communication system and a recording medium recording computer program. The wireless communication terminal has a first wireless communication unit which performs data communication via a first wireless communication system and a second wireless communication unit which performs voice communication via a second wireless communication system. When an instruction of starting a voice communication is given, a temporal withdrawal process is started to the first wireless communication system, and an acquiring process of the second wireless communication system is started. After the voice communication ends, until a predetermined time elapses, an acquiring state of the second wireless communication system by the second wireless communication unit is continued.; After the predetermined time has elapsed, the acquiring state of the second wireless communication system is cancelled, and a temporal withdrawal cancelling process is started to the first wireless communication system.


SECOND WIRELESS COMMUNICATION SYSTEM
VOICE COMMUNICATION
FIRST WIRELESS COMMUNICATION SYSTEM
FAST-SPEED DATA COMMUNICATION

(19)中华人民共和国国家知识产权局

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H04B 17/00(2006.01)

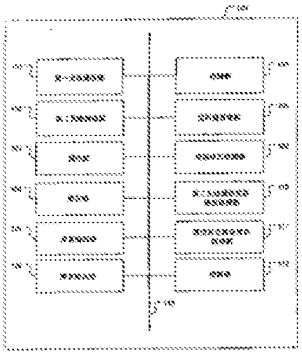
权利要求书 4 页 说明书 16 页 附图 9 页

(54)发明名称

无线通信终端、无线通信系统以及记录有计算机程序的记录介质

(57)摘要

本发明提供无线通信终端、无线通信系统以及记录有计算机程序的记录介质。一种无线通信终端，具备：第一无线通信部，进行经由第一无线通信系统的数据通信；以及第二无线通信部，进行经由第二无线通信系统的声音通信；在被指示了声音通信开始的情况下，对第一无线通信系统开始进行暂时脱离处理，开始第二无线通信系统的捕捉处理，在声音通信结束后经过规定的时间为止，持续上述第二无线通信部的第二无线通信系统的捕捉状态，在经过规定时间后，将第二无线通信系统的捕捉状态解除，对第一无线通信系统开始暂时脱离解除处理。



CN 102045864 A

1. 一种无线通信终端，其特征在于，具备：

第一无线通信部，以第一无线通信方式进行经由第一无线通信系统的数据通信；

第二无线通信部，以能够进行声音通信的第二无线通信方式进行经由第二无线通信系统的声音通信；以及

控制部，控制上述第一无线通信部和上述第二无线通信部；

上述控制部，

在被指示了声音通信的开始的情况下，

通过上述第一无线通信部对上述第一无线通信系统执行暂时脱离处理，并通过上述第二无线通信部执行上述第二无线通信系统的捕捉处理；

在上述声音通信结束之后，在满足规定的条件的情况下，

使上述第二无线通信部持续上述第二无线通信系统的捕捉状态。

2. 如权利要求 1 所述的无线通信终端，其特征在于，

上述控制部在上述声音通信结束之后持续上述第二无线通信系统的捕捉状态的期间，被指示了上述声音通信的开始的情况下，通过捕捉到的上述第二无线通信系统再开始上述声音通信。

3. 如权利要求 1 所述的无线通信终端，其特征在于，

上述控制部，

在上述声音通信结束后经过规定的时间为止，

使上述第二无线通信部持续上述第二无线通信系统的捕捉状态；

在经过上述规定的时间之后，

使上述第二无线通信部解除上述第二无线通信系统的捕捉状态；

使上述第一无线通信部对上述第一无线通信系统开始暂时脱离解除处理。

4. 如权利要求 3 所述的无线通信终端，其特征在于，

上述无线通信终端还具备检测部；

上述控制部，

在上述声音通信结束后经过上述规定的时间为止的期间，由上述检测部检测到规定的终端状态的情况下，

将上述第二无线通信部的上述第二无线通信系统的捕捉状态解除；

通过上述第一无线通信部对上述第一无线通信系统开始暂时脱离解除处理。

5. 如权利要求 4 所述的无线通信终端，其特征在于，

上述检测部具备对上述无线通信终端的开闭状态进行检测的机构；

上述控制部，

在上述声音通信结束后经过上述规定的时间为止的期间，由上述检测部检测到上述无线通信终端的关闭状态的情况下，

将上述第二无线通信部的上述第二无线通信系统的捕捉状态解除；

通过上述第一无线通信部对上述第一无线通信系统开始暂时脱离解除处理。

6. 如权利要求 4 所述的无线通信终端，其特征在于，

上述检测部具备对上述无线通信终端的周围的亮度进行检测的机构；

上述控制部，

在上述声音通信结束后经过上述规定的时间为止的期间，由上述检测部检测到上述无线通信终端的周围的亮度成为基准以下的情况下，

将上述第二无线通信部的上述第二无线通信系统的捕捉状态解除，并通过上述第一无线通信部对上述第一无线通信系统开始暂时脱离解除处理。

7. 如权利要求 4 所述的无线通信终端，其特征在于，

上述检测部具备对上述无线通信终端的运动进行检测的机构；

上述控制部，

在从上述声音通信结束后经过上述规定的时间为止的期间，由上述检测部检测到上述无线通信终端的运动成为基准以下的情况下，

将上述第二无线通信部的上述第二无线通信系统的捕捉状态解除，并通过上述第一无线通信部对上述第一无线通信系统开始暂时脱离解除处理。

8. 如权利要求 4 所述的无线通信终端，其特征在于，

上述检测部具备对上述无线通信终端所具备的规定的应用程序的起动状态进行检测的机构；

上述控制部，

在从上述声音通信结束后经过上述规定的时间为止的期间，由上述检测部检测到上述规定的应用程序的起动的情况下，

将上述第二无线通信部的上述第二无线通信系统的捕捉状态解除，并通过上述第一无线通信部对上述第一无线通信系统开始暂时脱离解除处理。

9. 如权利要求 4 所述的无线通信终端，其特征在于，

上述检测部具备对用户的规定的动作进行检测的机构；

上述控制部，

在从上述声音通信结束后经过上述规定的时间为止的期间，由上述检测部检测到上述规定的动作的情况下，

将上述第二无线通信部的上述第二无线通信系统的捕捉状态解除，并通过上述第一无线通信部对上述第一无线通信系统开始暂时脱离解除处理。

10. 如权利要求 3 所述的无线通信终端，其特征在于，

上述无线通信终端还具备取得通信对方的信息的通信对方确定信息取得部；

在经过上述规定的时间之前，上述通信对方确定信息取得部已被起动的情况下，

上述控制部使上述第二无线通信部持续上述第二无线通信系统的捕捉状态，直到上述通信对方确定信息取得部结束处理为止。

11. 如权利要求 3 所述的无线通信终端，其特征在于，

上述检测部具备对用户的规定的行为进行检测的机构；

在经过上述规定的时间之前由上述检测部检测到用户的规定的行为的情况下，上述控制部使上述第二无线通信部持续上述第二无线通信系统的捕捉状态。

12. 如权利要求 1 所述的无线通信终端，其特征在于，

上述控制部，

具备第二无线通信关联信息取得部，该第二无线通信关联信息取得部取得与由上述第二无线通信部进行的声音通信关联的信息；

在上述声音通信结束之后，根据上述第二无线通信关联信息取得部取得的信息，

使上述第二无线通信部执行持续上述第二无线通信系统的捕捉状态的处理，或者

执行使上述第二无线通信部解除上述第二无线通信系统的捕捉状态、并使上述第一无线通信部对上述第一无线通信系统开始暂时脱离解除处理的处理。

13. 如权利要求 12 所述的无线通信终端，其特征在于，

上述第二无线通信关联信息取得部所取得的信息包含通话对方信息，该通信对方信息表示上述声音通信的通话对方。

14. 如权利要求 12 所述的无线通信终端，其特征在于，

上述第二无线通信关联信息取得部所取得的信息包含表示上述声音通信的成立或不成立的信息。

15. 如权利要求 12 所述的无线通信终端，其特征在于，

上述第二无线通信关联信息取得部所取得的信息是包含上述声音通信的结束状态的信息。

16. 一种无线通信终端，其特征在于，具备：

第一无线通信机构，以第一无线通信方式进行经由第一无线通信系统的数据通信；

第二无线通信机构，以能够进行声音通信的第二无线通信方式进行经由第二无线通信系统的声音通信；以及

控制机构，控制上述第一无线通信机构和上述第二无线通信机构；

上述控制机构，

在被指示了声音通信的开始的情况下，

通过上述第一无线通信机构对上述第一无线通信系统执行暂时脱离处理，并通过上述第二无线通信机构执行上述第二无线通信系统的捕捉处理；

在上述声音通信结束之后，在满足规定的条件的情况下，

使上述第二无线通信机构持续上述第二无线通信系统的捕捉状态。

17. 一种无线通信系统，其特征在于，

具备进行数据通信的第一无线通信系统、进行声音通信的第二无线通信系统以及无线通信终端，

在被指示了上述声音通信的开始的情况下，在进行上述第二无线通信系统的声音通信之前，上述无线通信终端对上述第一无线通信系统开始暂时脱离处理，在上述声音通信结束之后，上述无线通信终端对上述第一无线通信系统开始暂时脱离解除处理，

在满足规定的条件的情况下，上述无线通信终端不对上述第一无线通信系统开始暂时脱离解除处理，在此期间被指示了上述声音通信的开始的情况下，对上述第二无线通信系统开始声音通信处理。

18. 一种记录介质，记录有对计算机的动作进行控制的计算机程序，该计算机具备：第一无线通信机构，进行经由第一无线通信系统的数据通信；以及第二无线通信机构，进行经由第二无线通信系统的声音通信，上述记录介质的特征在于，

记录有计算机程序，该计算机程序使计算机执行如下处理，即：

在被指示了上述声音通信的开始的情况下，

对上述第一无线通信系统执行暂时脱离处理，并执行上述第二无线通信系统的捕捉处

理，

在上述声音通信结束之后，在满足规定的条件的情况下，

持续上述第二无线通信系统的捕捉状态。

无线通信终端、无线通信系统以及记录有计算机程序的记录介质

[0001] 相关申请的交叉引用

[0002] 本申请基于 2009 年 10 月 21 日提出申请的日本专利申请 2009-242894 号。在本说明书中，将日本专利申请 2009-242894 号的说明书、权利要求书、附图的所有内容作为参照引用。

技术领域

[0003] 本发明涉及对应于两个以上无线通信方式的无线通信终端、无线通信系统以及记录有计算机程序的记录介质。

背景技术

[0004] 当前，作为下一代高速无线通信方式（或者下一代高速无线通信系统），推进了 LTE(Long Term Evolution：长期演进）的开发。LTE 具有最大 20MHz 的宽的带宽，通过在下行通信中采用 OFDMA(Orthogonal FrequencyDivision Multiple Access：正交频分多址）以及 MIMO(Multiple Input MultipleOutput：多输入多输出）、在上行通信中采用 SC-FDMA(Single-CarrierFrequency Division Multiple Access：单载波频分多址）等，在下行通信中最大能够实现超过 300Mbps，在上行通信中最大能够实现 75Mbps。

[0005] 由于 LTE 是为包通信特殊化的通信方式，所以能够想到即使是能够利用 LTE 的无线通信终端，对于基于线路交换的声音通信，也会利用 W-CDMA 或 cdma2000 1x 那样的以往的通信方式。在总是同时等待声音通信用的无线通信系统和 LTE 系统两者的无线通信终端中，无线通信终端的通常的等待中的消耗电流变大。在仅等待 LTE 系统的无线通信终端中，在通常状态下不能接受声音来信，所以作为所谓的“电话”的功能不再成立。在仅等待声音通信用的无线通信系统的无线通信终端中，不能发挥 LTE 的不间断 IP 连接性的优点。

[0006] 为了解决这些问题，在 LTE 系统中，可以考虑 CS(Circuit Switched：线路转接）Fallback（回落）的功能。在 CS Fallback 中，将来自 W-CDMA 或 cdma2000 1x 等的声音通信用无线通信系统的声音来信通知通传 (tunneling) 到 LTE 系统上，传送给无线通信终端。接收到声音来信通知的无线通信终端对 LTE 系统进行暂时脱离（中断：Suspend）处理，并对声音通信用无线通信系统进行线路连接处理而执行声音通信。在声音通信结束后，无线通信终端对声音通信用无线通信系统进行线路释放处理，对 LTE 系统进行暂时脱离解除（再开始：Resume）处理，回到等待 LTE 系统的状态。CS Fallback 的动作并不限于声音来信处理，在声音发信处理的情况下也是同样的动作。

[0007] 如上所述，通常采用仅能够等待 LTE 系统的 LTE 的无线通信终端与采用了能够等待声音通信用无线通信系统和 LTE 系统两者的 LTE 的无线通信终端相比能够减小消耗电流。除此以外，在采用仅能够等待 LTE 系统的 LTE 的无线通信终端中，具有还能够接受声音来信的优点（例如，参照非专利文献：3GPP TS 23.272V8.4.0(2009-06)，“3rd Generation Partnership Project；Technical Specification Group Services and System Aspects；

Circuit SwitchedFallback in Evolved Packet System;Stage 2(Release 8)")。

[0008] 但是,在以往的采用 LTE 的无线通信终端中,在短期间内连续发生声音来信或声音发信的情况下,例如在通过声音来信而开始的通话结束后立即重新打电话的情况下,或在虽然进行了声音发信处理但由于对方没有应答而立即向别的对方打电话的情况下,由于 LTE 系统的暂时脱离处理和暂时脱离解除处理进行动作,所以存在在发信处理中花费时间的问题。此外,在以往的采用 LTE 的无线通信终端中,将用于进行暂时脱离解除处理的控制消息和用于进行暂时脱离处理的控制消息在无线上短期间内收发,因而存在浪费无线资源的问题。

[0009] 此外,在具备以第一无线通信方式进行数据通信的第一无线通信部、和以能够进行声音通信的第二无线通信方式进行通信的第二无线通信部的无线通信终端中,一般也会发生与上述同样的问题。

发明内容

[0010] 本发明是鉴于如上所述的问题而做出的,目的是提供一种在连续进行声音通信处理的情况下,能够防止声音通信处理时间花费较长,并且能够防止无线资源的浪费的无线通信终端、无线通信系统以及记录有计算机程序的记录介质。

[0011] 为了达到上述目的,有关本发明的第 1 观点的无线通信终端,具备:

[0012] 第一无线通信部,以第一无线通信方式进行经由第一无线通信系统的数据通信;

[0013] 第二无线通信部,以能够进行声音通信的第二无线通信方式进行经由第二无线通信系统的声音通信;以及

[0014] 控制部,控制上述第一无线通信部和上述第二无线通信部;

[0015] 上述控制部,

[0016] 在被指示了声音通信的开始的情况下,

[0017] 通过上述第一无线通信部对上述第一无线通信系统执行暂时脱离处理,并通过上述第二无线通信部执行上述第二无线通信系统的捕捉处理;

[0018] 在上述声音通信结束之后,在满足规定的条件的情况下,

[0019] 使上述第二无线通信部持续上述第二无线通信系统的捕捉状态。

[0020] 为了达到上述目的,有关本发明的第 2 观点的无线通信终端,具备:

[0021] 第一无线通信机构,以第一无线通信方式进行经由第一无线通信系统的数据通信;

[0022] 第二无线通信机构,以能够进行声音通信的第二无线通信方式进行经由第二无线通信系统的声音通信;以及

[0023] 控制机构,控制上述第一无线通信机构和上述第二无线通信机构;

[0024] 上述控制机构,

[0025] 在被指示了声音通信的开始的情况下,

[0026] 通过上述第一无线通信机构对上述第一无线通信系统执行暂时脱离处理,并通过上述第二无线通信机构执行上述第二无线通信系统的捕捉处理;

[0027] 在上述声音通信结束之后,在满足规定的条件的情况下,

[0028] 使上述第二无线通信机构持续上述第二无线通信系统的捕捉状态。

[0029] 为了达到上述目的，有关本发明的第 3 技观点的无线通信系统，

[0030] 具备进行数据通信的第一无线通信系统、进行声音通信的第二无线通信系统以及无线通信终端，

[0031] 在被指示了上述声音通信的开始的情况下，在进行上述第二无线通信系统的声音通信之前，上述无线通信终端对上述第一无线通信系统开始暂时脱离处理，在上述声音通信结束之后，上述无线通信终端对上述第一无线通信系统开始暂时脱离解除处理，

[0032] 在满足规定的条件的情况下，上述无线通信终端不对上述第一无线通信系统开始暂时脱离解除处理，在此期间被指示了上述声音通信的开始的情况下，对上述第二无线通信系统开始声音通信处理。

[0033] 为了达到上述目的，有关本发明的第 4 观点的记录介质，记录有对计算机的动作进行控制的计算机程序，该计算机具备：第一无线通信机构，进行经由第一无线通信系统的数据通信；以及第二无线通信机构，进行经由第二无线通信系统的声音通信，

[0034] 上述记录介质记录有计算机程序，该计算机程序使计算机执行如下处理，即：

[0035] 在被指示了上述声音通信的开始的情况下，

[0036] 对上述第一无线通信系统执行暂时脱离处理，并执行上述第二无线通信系统的捕捉处理，

[0037] 在上述声音通信结束之后，在满足规定的条件的情况下，

[0038] 持续上述第二无线通信系统的捕捉状态。

[0039] 根据有关本发明的无线通信终端、无线通信系统以及记录有程序的记录介质，在连续进行声音通信处理的情况下，能够比以往缩短声音通信处理时间。此外，根据有关本发明的无线通信终端、无线通信系统以及记录有计算机程序的记录介质，能够抑制无线资源的浪费。

附图说明

[0040] 图 1 是有关本发明的实施方式 1 的无线通信系统的结构图。

[0041] 图 2 是图 1 所示的无线通信终端的结构图。

[0042] 图 3 是表示以往的 CSFB 处理的处理流程的概念图。

[0043] 图 4A 及图 4B 是表示有关本发明的实施方式 1 的无线通信终端的处理流程的图。

[0044] 图 5 是表示有关本发明的实施方式 1 的无线通信系统的处理流程的概念图。

[0045] 图 6 是表示有关本发明的实施方式 2 的无线通信终端的处理流程的概念图。

[0046] 图 7 是表示有关本发明的实施方式 3 的无线通信终端的处理流程的概念图。

[0047] 图 8 是表示有关本发明的实施方式 4 的无线通信终端的处理流程的概念图。

[0048] 图 9 是表示有关本发明的实施方式 5 的无线通信终端的处理流程的概念图。

具体实施方式

[0049] 以下，对有关本发明的实施方式的无线通信终端及无线通信系统进行说明。

[0050] （实施方式 1）

[0051] 系统整体结构

[0052] 有关本实施方式的无线通信系统 10 如图 1 所示，包括无线通信终端 100、无线通信

基站 200、移动管理装置 300、网关装置 400、无线通信基站 500 以及基站控制装置 600。

[0053] 无线通信基站 200、移动管理装置 300、网关装置 400 是构成第一无线通信系统（以下称作通信系统 A）的网络装置。通信系统 A 例如支持 LTE、HSPA(High Speed Packet Access：高速分组接入）、EV-DO、WiMAX 等通信方式，主要提供高速的数据通信服务。另外，虽然没有图示，但除此以外也可以包括认证服务器、加入者信息管理服务器、策略 / 收费控制服务器等。

[0054] 无线通信基站 500、基站控制装置 600 是构成第二无线通信系统（以下称作通信系统 B）的网络装置。通信系统 B 例如支持 W-CDMA、cdma2000 1x、PHS(Personal Handy phone System：个人手持式电话系统）等通信方式，主要提供声音通信服务。不仅提供声音通信服务，有时还提供数据通信服务。另外，虽然没有图示，但除此以外也可以包括认证服务器、加入者信息管理服务器、策略 / 收费控制服务器等。

[0055] 无线通信基站 200 经由无线接口，而与管辖区域（小区）内的无线通信终端 100 进行无线通信（主要是高速数据通信）。例如，在 LTE 系统的情况下，ENB(Evolved Node B：演进性节点 B）对应于此。

[0056] 移动管理装置 300 具有无线通信终端 100 的位置信息管理、会话 (session) 管理、连接的网关装置管理等功能。例如，在 LTE 系统的情况下，MME(Mobility Management Entity：移动性管理实体）对应于此。

[0057] 网关装置 400 具有数据通信量的转送、移交时的数据转送路径切换等功能。例如，在 LTE 系统的情况下，S-GW(Serving Gateway：服务网关）对应于此。

[0058] 无线通信基站 500 经由无线接口，而与管辖区域（小区）内的无线通信终端 100 进行无线通信（主要是声音通信）。例如，Node B、BTS(Base Transceiver Station：基准收发站）、BS(Base Station：基站）对应于此。

[0059] 基站控制装置 600 进行无线通信终端 100 的位置登记、认证、收发信处理、移交控制等。例如，RNC(Radio Network Control：无线网络控制器）、MSC(Mobile Switching Center：移动交换中心）对应于此。

[0060] 图 1 所示的无线通信系统 10 中，通过将基站控制装置 600 和移动管理装置 300 连接，成为能够进行通信系统 A 与通信系统 B 的相互连接的具备相互连接性的结构。在图 1 中，两者直接连接，但也可以在两者之间夹装 CS IWS(Circuit Switched fallback Interworking Solution function：线路转接回落互操作功能实体）那样的装置。

[0061] 另一方面，无线通信终端 100 对应于上述通信系统 A 和通信系统 B，构成为能够与无线通信基站 200 及无线通信基站 500 进行无线通信。以下，参照图 2 具体地说明该结构。

[0062] 图 2 是表示无线通信终端 100 的结构的结构图。

[0063] 无线通信终端 100 如图 2 所示，具备第一无线通信部 101、第二无线通信部 102、操作部 103、显示部 104、声音输出部 105、声音输入部 106、存储部 107、定时器管理部 108、终端状态检测部 109、第二无线通信关联信息取得部 110、通信对方确定信息取得部 111、控制部 112 以及总线 113。

[0064] 第一无线通信部 101 支持通信系统 A，经由无线通信基站 200 收发各种数据。此外，第一无线通信部 101 基于 LTE、HSPA、EV-DO、WiMAX 等无线通信方式进行无线通信。

[0065] 第二无线通信部 102 支持通信系统 B，经由无线通信基站 500 进行声音通话和各种

数据的收发。此外，第二无线通信部 102 基于 W-CDMA、cdma2000 1x、PHS 等无线通信方式进行无线通信。

[0066] 操作部 103 具备键盘、光标键、数字键等，受理来自用户的操作，并将操作信号输入到控制部 112 中。

[0067] 显示部 104 由点矩阵型的 LCD(Liquid Crystal Display) 面板等显示面板、驱动电路等构成。显示部 104 通过控制部 112 的控制而显示任意的数据（例如字符、图像、影像等）。

[0068] 声音输出部 105 具备扬声器、DAC(Digital Analog Converter ;数字模拟转换器）等，例如，对从第二无线通信部 102 接收到的声音信号实施 DA 变换，通过扬声器放音。

[0069] 声音输入部 106 具备麦克风等，在通话时等收集声音信号，并对第二无线通信部 102 供给该声音信号。

[0070] 存储部 107 由内置在无线通信终端 100 中的存储器、可拆卸的外部存储器等构成，存储各种程序及数据。存储部 107 例如存储控制部 112 的动作控制用程序。此外，存储部 107 将通话目标的名称、电话号码、邮件地址、其他属性信息等分别建立对应，作为电话簿存储。

[0071] 定时器管理部 108 例如由软件定时器等构成，基于控制部 112 的控制，计测从某个时点起的经过时间，判断是否经过了规定的时间。

[0072] 终端状态检测部 109 在声音通话结束后间接地检测用户的否定再通话的可能性的行为。具体而言，终端状态检测部 109 由检测无线通信终端 100 的关闭状态（在无线通信终端 100 是开闭式的便携电话等的情况下）的开关、检测周围的亮度的光传感器、检测无线通信终端 100 的振动及朝向的加速度传感器、取得无线通信终端 100 所具备的各种应用的起动状态的程序等中的某种、或者它们的组合构成。

[0073] 这里，开闭状态检测开关在无线通信终端 100 是折叠型的情况下，检测无线通信终端 100 被折叠而难以进行声音通信的状态，在无线通信终端 100 是滑动型的情况下，检测两个壳体被叠合而难以进行声音通信的状态等。

[0074] 此外，光传感器检测无线通信终端 100 的周围的亮度为基准水平以下（周围变暗）的情况。

[0075] 加速度传感器检测无线通信终端 100 的振动及朝向。

[0076] 起动检测程序检测无线通信终端 100 所具备的应用程序被起动的情况。

[0077] 第二无线通信关联信息取得部 110 取得与第二无线通信部 102 进行的无线通信关联的信息。所谓与第二无线通信部 102 进行的无线通信关联的信息，例如是正在进行通信的对方（通话目标）的名称、电话号码、识别信息等的对方信息、通信所花费的时间、通信结束理由等。这些信息通过从存储部 107 读出、监视第二无线通信部 102 的通信、由基站控制装置 600 经由无线通信基站 500 通知、等的方法取得。

[0078] 通信对方确定信息取得部 111 例如是访问存储在无线通信终端 100 的存储部 107 中的电话簿的功能、通过用户操作来受理发信电话号码的输入的功能、Web 上的电话号码数据库访问功能等中的某种、或者它们的组合。

[0079] 控制部 112 由微处理单元等构成，执行存储在存储部 107 中的动作控制用的程序，控制无线通信终端 100 整体的动作。

[0080] 总线 113 在图 2 所示的各部 101 ～ 112 之间相互传送数据。

[0081] 以往的 CSFB 处理的流程

[0082] 下面，利用图 3，对以往的 CS Fallback（以下简称作 CSFB）功能的动作进行说明。另外，无线通信系统的结构以及无线通信终端的功能结构与图 1 及图 2 所示的是同样，所以省略说明。

[0083] 作为初始状态，假设无线通信终端 100 在通信系统 A 中处于待机状态 (S100)。所谓待机状态，是无线通信终端 100 对属于通信系统 A 的小区（或者无线基站）完成同步处理、并接收到由该小区报告的关于通信系统 A 的系统信息的状态，是所谓的“camp on”的状态。进而，在待机状态下，无线通信终端 100 有时对通信系统 A 的网络装置（移动管理装置 300 或网关装置 400）请求位置登记处理、会话 (Session) 或承载 (Bearer) 的建立处理等。由于无线通信终端 100 通常处于通信系统 A 的待机状态，因此具有数据通信的起动时间变快，网络侧能够对无线通信终端 100 起动服务等的优点。

[0084] 在步骤 S100 的状态下，在从通话对方（未图示）向无线通信终端 100 进行了声音发信处理的情况下，以无线通信终端 100 为目的地的声音来信通知被传送到通信系统 B 的基站控制装置 600(S101)。基站控制装置 600 将以无线通信终端 100 为目的地的声音来信通知跨过通信系统 A 与 B 之间，传送给通信系统 A 的移动管理装置 300(S102)。移动管理装置 300 将以无线通信终端 100 为目的地的声音来信通知经由无线通信基站 200 传送给无线通信终端 100(S103)。在步骤 S102、S103 中，将通信系统 B 的声音来信通知在通信系统 A 的控制消息上通传而传送。

[0085] 接收到声音来信通知的无线通信终端 100 经由无线通信基站 200 对移动管理装置 300 传送 CSFB 开始通知 (S104)。移动管理装置 300 对无线通信基站 200 传送 CSFB 开始通知 (S105)。

[0086] 无线通信终端 100 定期地测量待机小区的接收状态和周边小区的接收状态，对无线通信基站 200 报告其结果 (S106)。所谓接收状态，是 RSSI(Received Signal Strength Indicator ：接收信号强度指示）、RSRP(ReferenceSignal Received Power ：参考信号接收功率）、RSRQ(Reference SignalReceived Quality ：参考信号接收质量）等。上述测量和结果报告是基本上与声音来信通知的有无无关而恒常地进行的动作。但是，也可以以声音来信通知接收为契机开始处理。

[0087] 接收到了无线通信终端 100 发送的测量结果报告的无线通信基站 200 对无线通信终端 100 通知重定向 (redirection) 指示，起动连接释放处理 (S107)。重定向目标及重定向定时由无线通信基站 200 根据测量结果报告的内容决定。在连接释放处理中，无线通信终端 100 和无线通信基站 200 分别将为了在两者间进行无线通信而确保的无线资源释放，并将关联的管理信息等删除。如果需要，则在两者之间交换控制消息。

[0088] 如果连接释放处理完成，则无线通信基站 200 对移动管理装置 300 传送连接释放通知 (S108)。接收到了连接释放通知的移动管理装置 300 对网关装置 400 进行暂时脱离（暂停 (suspend)）处理 (S109)。在暂时脱离处理中，移动管理装置 300 和网关装置 400 将为了传送以无线通信终端 100 为目的地的数据而确保的通信资源进行部分释放或者暂时停止、或者将关联的管理信息等进行部分删除。如果需要，则在两者之间交换控制消息。此外，也可以使以无线通信终端 100 为目的地的数据的缓冲功能有效。总之，通过这里不将通

信资源及管理信息全部释放、全部删除，在之后的暂时脱离解除处理中能够在短时间内再开始通信。

[0089] 另一方面，在步骤S107中进行了连接释放处理的无线通信终端100进行通信系统B的捕捉处理(S110)。此时，无线通信终端100在通信系统B中进行全小区探索，或按照步骤S107的重定向指示，决定要捕捉的无线通信基站500。

[0090] 接着，无线通信终端100对捕捉到的通信系统B的无线通信基站500进行来信应答处理及连接建立处理(S111)。无线通信基站500在与基站控制装置600之间进行来信应答处理及连接建立处理(S112)。

[0091] 如果步骤S111、S112的处理完成，则无线通信终端100成为能够在通信系统B上进行声音通话的状态(S113)。

[0092] 如果声音通话结束，则无线通信终端100进行与无线通信基站500之间的连接释放处理(S114)。此外，无线通信基站500进行与基站控制装置600之间的连接释放处理(S115)。在通信系统B中，基本上联系无线通信终端100与无线通信基站500之间的无线资源的确保状况，具有在无线通信基站500及基站控制装置600中需要的通信资源。因此，基本上不具有仅对无线通信基站500或基站控制装置600保留通信资源的暂时脱离处理及暂时脱离解除处理的功能。

[0093] 连接释放处理完成后的无线通信终端100在通信系统A中进行小区探索，选择待机的小区(S116)。无线通信终端100经由所选择的小区的无线通信基站200对移动管理装置300传送CSFB结束通知(S117)。接收到了CSFB结束通知的移动管理装置300对网关装置400进行暂时脱离解除(再继续(resume))处理(S118)。在暂时脱离解除处理中，移动管理装置300和网关装置400在步骤S109中进行部分释放或暂时停止的通信资源的再确保或再开始，或进行部分删除的管理信息的再建立。如果需要，则在两者之间交换控制消息。此外，也可以将以无线通信终端100为目的地缓冲的数据开始向无线通信终端100转送。并且，无线通信终端100成为通信系统A中的待机状态(S119)。

[0094] 以上是以往的声音来信时的CSFB处理的流程。声音发信时的CSFB处理的流程在通信系统B的捕捉前对网关装置400进行暂时脱离处理、在通信系统B中的声音通信结束后再捕捉通信系统A而对网关装置400进行暂时脱离解除处理的情况与声音来信时的流程相同。

[0095] 有关实施方式1的无线通信终端100处理的流程

[0096] 接着，参照图4A及图4B，说明有关实施方式1的无线通信终端100的处理。

[0097] 另外，图4A及图4B所示的各步骤通过由控制部112执行存储在存储部107中的动作控制程序，通过控制部112的控制来执行。

[0098] 如果将无线通信终端100的电源接通(S200)，则控制部112控制第一无线通信部101，捕捉通信系统A。第一无线通信部101在通信系统A中成为待机状态(S201)。此时，不进行第二无线通信部102的通信系统B的捕捉处理及接收状态测量。在此状态下，在接收到声音通信开始指示的情况下(S202：是)，控制部112对通信系统A(即无线通信基站200)经由第一无线通信部101发送CSFB开始通知(S203)。另一方面，在没有接收到声音通信开始指示的情况下(S202：否)，控制部112等到接收到声音通信开始指示(S202)。另外，所谓声音通信开始指示，是与图3的步骤S103同样的来自其他终端装置的声音来信通

知、或用户操作操作部 103 而进行发信操作，控制部 112 发出的声音发信处理开始指示。此外，步骤 S203 的 CSFB 开始通知与图 3 的步骤 S104 的 CSFB 开始通知相同。

[0099] 在步骤 S203 中发送了 CSFB 开始通知之后，控制部 112 等待接收从通信系统 A 的基站 200 经由第一无线通信部 101 向通信系统 B 的转移指示 (S204)。这相当于图 3 的步骤 S107 的重定向指示。如果第一无线通信部 101 接收到向通信系统 B 的转移指示 (S204 ：是)，则控制部 112 通过第二无线通信部 102 进行通信系统 B 的捕捉处理 (S205)。即，进行捕捉无线通信基站 500 的处理。这相当于图 3 的步骤 S110。如果通信系统 B 的小区的捕捉成功 (S206 ：是)，则控制部 112 经由第二无线通信部 102 对该小区发送发信请求 (S207)。这相当于图 3 的步骤 S111 的处理。另一方面，在通信系统 B 的小区的捕捉失败的情况下 (S206 ：否)，控制部 112 通过第一无线通信部 101 在通信系统 A 中重新进行小区选择 (S208)，回到步骤 S201 的状态。

[0100] 在执行了步骤 S207 之后，无线通信终端 100 在控制部 112 的控制下，在通信系统 B 中成为通话状态 (S209)。这相当于图 3 的步骤 S113。

[0101] 无线通信终端 100 如果结束通信系统 B 中的通话 (S210 ：是)，则定时器管理部 108 使定时器开始计测 (S211)。例如，在用户操作操作部 103 而指示了通话结束的情况下，在由通信系统 B 指示了通信的切断的情况下，或者在来自通信系统 B 的无线通信基站 500 的接收电波的强度为基准值以下而将通信切断的情况下等，控制部 112 响应于来自第二无线通信部 102 的通话切断的通知等，控制定时器管理部 108，开始计时。

[0102] 如果经过规定的时间而定时器到时 (S212 ：是)，则定时器管理部 18 将该情况通知给控制部 112。控制部 112 响应于通知，控制第一无线通信部 101，进行通信系统 A 的捕捉处理 (S213)。这相当于图 3 的步骤 S116。另外，这里规定的时间设定为认为用户再次进行发信操作的可能性较高的长度，例如设定为 30 秒。

[0103] 如果通信系统 A 的小区的捕捉成功 (S216 ：是)，则控制部 112 控制第一无线通信部 101，对该小区发送 CSFB 结束通知 (S217)。这相当于图 3 的步骤 S117。如果以上完成，则回到第一无线通信部 101 的、通信系统 A 中的待机状态 (S201)。这相当于图 3 的步骤 S119。在步骤 S216 中通信系统 A 的小区的捕捉失败的情况下 (S216 ：否)，控制部 112 控制第一无线通信部 101 及第二无线通信部 102，在所有的无线通信系统中重新进行小区选择 (S218)。如果能够捕捉到通信系统 A，则回到步骤 S201 的状态。在不能捕捉到通信系统 A 的情况下，进行通信系统 B 的捕捉处理、或进行圈外休眠处理等 (未图示)。另外，在持续接收到声音通信开始指示的情况下，重复进行以上的处理。

[0104] 在步骤 S212 中判断为定时器未到时的情况下 (S212 ：否)，无线通信终端 100 保持通信系统 B 中的待机状态 (S214)。这里，控制部 112 在接收到声音通信开始指示的情况下 (S215 ：是)，使控制回到步骤 S207，经由第二无线通信部 102 对通信系统 B 的小区发送发信请求。另一方面，如果没有接收到声音通信开始指示 (S215 ：否)，则回到定时器是否到时的判断处理 (S212)。

[0105] 如以上说明，本实施方式的无线通信终端 100 在通信系统 B 中的声音通话结束后，不是立即转移到通信系统 A 的捕捉处理，而是在满足一定的条件的情况下，即在满足规定的时间内这一条件的情况下，维持通信系统 B 的捕捉状态，然后转移到通信系统 A 的捕捉处理。通过采用该处理顺序，在声音通话结束之后、在规定的时间内由用户进行了发信操作的

情况下，能够不进行以往需要的步骤S203到S206的处理而对通信系统B发送发信请求。因此，能够缩短声音通信开始之前的时间。此外，在此期间，不需要发送步骤S217的CSFB结束通知和步骤S203的CSFB开始通知，还能够节约无线资源。

[0106] 无线通信系统10的处理的流程

[0107] 接着，利用图5对有关实施方式1的无线通信系统10的处理流程进行说明。本处理流程的大部分与图3相同，对于与图3相同的处理赋予与图3相同的序号。

[0108] 步骤S 100到S115的动作与图3的处理相同。即，作为初始状态，假设无线通信终端100在通信系统A中处于待机状态(S100)。在待机状态(步骤S100)下，在由通话对方以无线通信终端100为目的地进行了声音发信处理的情况下，以无线通信终端100为目的地的声音来信通知传送到通信系统B的基站控制装置600(S101)。基站控制装置600将以无线通信终端100为目的地的声音来信通知跨过通信系统A和B之间而传送给通信系统A的移动管理装置300(S102)。移动管理装置300将以无线通信终端100为目的地的声音来信通知经由无线通信基站200传送给无线通信终端100(S103)。

[0109] 接收到了声音来信通知的无线通信终端100经由无线通信基站200对移动管理装置300传送CSFB开始通知(S104)。移动管理装置300对无线通信基站200传送CSFB开始通知(S105)。

[0110] 无线通信终端100定期地测量待机小区的接收状态和周边小区的接收状态，对无线通信基站200报告其结果(S106)。

[0111] 接收到了无线通信终端100发送测量结果报告的无线通信基站200对无线通信终端100通知重定向指示，起动连接释放处理(S107)。

[0112] 如果连接释放处理完成，则无线通信基站200对移动管理装置300传送连接释放通知(S108)。接收到了连接释放通知的移动管理装置300对网关装置400进行暂时脱离(暂停)处理(S109)。在暂时脱离处理中，移动管理装置300和网关装置400将为了传送以无线通信终端100为目的地的数据而确保的通信资源进行部分释放或暂时停止，或将关联的管理信息等进行部分删除。

[0113] 在步骤S107中进行了连接释放处理的无线通信终端100进行通信系统B的捕捉处理(S110)。

[0114] 接着，对捕捉到的通信系统B的无线通信基站500进行来信应答处理及连接建立处理(S111)。无线通信基站500在与基站控制装置600之间进行来信应答处理及连接建立处理(S112)。

[0115] 如果步骤S111、S112的处理完成，则无线通信终端100成为能够在通信系统B上进行声音通话的状态(S113)。

[0116] 如果声音通话结束，则无线通信终端100进行与无线通信基站500之间的连接释放处理(S114)。此外，无线通信基站500进行与基站控制装置600之间的连接释放处理(S115)。

[0117] 如果声音通话结束、且在S114、S115中将无线通信终端100与无线通信基站500间的连接、无线通信基站500与基站控制装置600间的连接释放，则无线通信终端100的定时器管理部108起动定时器(S120)。这相当于图4B的步骤S211。如果在此状态下经过规定的时间而定时器到时(S121)，则向步骤S116的待机小区选择处理转移。在定时器到时之

前，无线通信终端 100 保持通信系统 B 中的待机状态。其后的步骤 S117 到 S119 的动作与图 3 的处理相同。在 S119 的状态下对无线通信终端 100 有新的声音通信开始指示的情况下，再次进行步骤 S104 到 S110 的一系列的处理，向声音通话处理转移。

[0118] 但是，在步骤 S121 的定时器到时前、对无线通信终端 100 有新的声音通信开始指示的情况下（相当于图 4B 的 S215 ：是），无线通信终端 100 对无线通信基站 500 发出声音通信开始请求 (S122)，进行连接建立处理、声音通信处理 (S123)。然后，在定时器到时的情况下 (S121)，进行与图 3 的 S116 到 S119 所示的处理同样的处理。

[0119] 通过如以上那样进行处理，在连续进行声音通信动作时，能够缩短声音通信开始之前的时间，能够提高无线通信系统的方便性。此外，由于在此期间不需要发送步骤 S117 的 CSFB 结束通知和 S104 的 CSFB 开始通知，所以还能够节约无线资源。

[0120] 另外，也可以由用户设定操作部 103，以便能够将由定时器计测的“规定的时间”设定、存储到存储部 107 等中。在此情况下，在步骤 S211 中，控制部 112 读取存储在存储部 107 中的时间，定时器管理部 108 将所读取的时间设定到定时器中。

[0121] 此外，也可以是，控制部 112 每次计时并记录从声音通话的结束到下次声音通话的开始的时间，将其统计处理，并将认为用户再次进行发信操作的可能性较高的时间自动设定为规定的时间。例如，也可以是求出从通话结束到再通话的时间并进行统计处理，将覆盖再通话的 80％以上的时间设定为规定时间。

[0122] （实施方式 2）

[0123] 在实施方式 1 中，在声音通话结束后经过规定的时间为止，第二通信部 102 维持捕捉了通信系统 B 的状态。但是，在显然用户不再进行声音通话情况下，希望将通信系统 A 的暂时脱离状态迅速解除。以下，说明在判断为用户不进行声音通话的情况下，即使从声音通话结束起是规定时间内、也结束暂时脱离状态的实施方式。

[0124] 另外，本实施方式的无线通信系统 10 和无线通信终端 100 的结构分别与图 1 及图 2 所示的结构相同。

[0125] 此外，这些基本动作也与参照图 4A 及图 4B、图 5 说明的动作大致相同，以下，参照图 6 对无线通信终端 100 的动作的特征性的部分进行说明。

[0126] 在本实施方式中，也是控制部 112 进行图 4A 及图 4B 的步骤 S200 ～ S209 的处理，通过通信系统 B 进行声音通话，如果检测到通话结束 (S210 ：是)，则起动定时器 (S211)。在步骤 S211 中开始计测的定时器没有到时的期间 (S212 ：否)，控制部 112 基于终端状态检测部 109 检测到的值，进行是否为用户不进行声音通话的状态、具体而言无线通信终端 100 是否为规定的终端状态的判断处理 (S219)。对于该判断处理在后面说明。在判断为成为了规定的终端状态的情况下 (S219 ：是)，无线通信终端 100 不等待定时器到时而转移到通信系统 A 的捕捉处理 (S213)。在判断为没有成为规定的终端状态的情况下 (S219 ：否)，无线通信终端 100 保持通信系统 B 中的待机状态 (S214)。

[0127] 这样，通过在通信系统 B 中的声音通话结束后的规定的时间处于通信系统 B 的待机状态，在规定时间的期间用户进行了发信操作的情况下能够缩短声音通信开始之前的时间。进而，在虽然是经过规定的时间之前、但用户进行了表示不进行声音通话的规定的动作的情况下，具体而言，在无线通信终端 100 的状态成为了规定的状态的情况下，通过回到通信系统 A 的待机状态，在用户进行发信操作的可能性变低的情况下成为在通信系统 A 中能

够迅速起动数据通信的状态，能够提高使用方便性。

[0128] 这里，说明步骤 S219 的判断处理的具体例。

[0129] 例如，假设无线通信终端 100 是将多个壳体通过铰链结合的折叠型，终端状态检测部 109 由检测无线通信终端 100 的开闭状态的开关构成。在此情况下，在声音通话结束后，如果无线通信终端 100 被折叠，则通常理解为用户没有再开始声音通话的意愿。所以，在无线通信终端 100 成为闭合的状态的情况下，终端状态检测部 109 根据用户的规定的动作判断为无线通信终端 100 成为了规定的终端状态。

[0130] 此外，假设例如无线通信终端 100 是多个壳体可滑动地结合的滑动型，终端状态检测部 109 由检测多个壳体被叠合面紧凑化的关闭状态的开关构成。在此情况下，在声音通话结束后，如果构成无线通信终端 100 的壳体被叠合面关闭，则通常理解为用户没有再开始声音通话的意愿。所以，在无线通信终端 100 成为闭合的状态的情况下，终端状态检测部 109 根据用户的规定的动作判断为无线通信终端 100 成为了规定的终端状态。在这些情况下，如果由终端状态检测部 109 检测到无线通信终端 100 被闭合，则控制部 112 看作为“是”判断，进行通信系统 A 的捕捉处理。

[0131] 这样，通过在通信系统 B 中的声音通话结束后的规定时间处于通信系统 B 的待机状态，在规定的时间的期间用户进行了发信操作的情况下，能够缩短声音通信开始之前的时间。进而，在声音通话结束后，在虽然是经过规定的时间之前、但无线通信终端 100 被闭合的情况下，通过回到通信系统 A 的待机状态，在用户进行发信操作的可能性变低的情况下成为在通信系统 A 中能够迅速起动数据通信的状态。因而，能够提高使用方便性。

[0132] 此外，也可以将规定的终端状态设为“无线通信终端 100 被从亮处放到暗处的状态”。在此情况下，终端状态检测部 109 例如由检测无线通信终端 100 的周围的亮度的光传感器构成。在此情况下，如果终端状态检测部 109 检测到无线通信终端 100 的周围的亮度从比基准亮的状态变化为比基准暗的状态，则控制部 112 在步骤 S219 中判断为“是”，进行通信系统 A 的捕捉处理。无线通信终端 100 的周围的亮度从比基准亮的状态变化为比基准暗的状态的情况例如是无线通信终端 100 被放到了包中或袋中那样的暗处的情况。

[0133] 这样，通过在通信系统 B 中的声音通话结束后的规定的时间处于通信系统 B 的待机状态，在规定的时间的期间用户进行了发信操作的情况下能够缩短声音通信开始之前的时间。进而，在虽然是经过规定的时间之前、但无线通信终端 100 被放到包中等的情况下，通过回到通信系统 A 的待机状态，在用户进行发信操作的可能性变低的情况下能够在通信系统 A 中迅速起动数据通信。因而，能够提高使用方便性。

[0134] 此外，也可以将规定的终端状态设为“无线通信终端 100 被放置到稳定的地方的状态”。在此情况下，终端状态检测部 109 例如由检测无线通信终端 100 的振动及朝向的加速度传感器或接触传感器构成。在此情况下，如果终端状态检测部 109 检测到无线通信终端 100 的运动比规定的大小小，则控制部 112 在步骤 S219 中判断为“是”，进行通信系统 A 的捕捉处理。无线通信终端 100 的运动比规定的大小小的情况例如是无线通信终端 100 被放置到桌子上或支架 (cradle) 那样的稳定的地方的情况。

[0135] 这样，通过在通信系统 B 中的声音通话结束后的规定时间处于通信系统 B 的待机状态，在规定的时间的期间用户进行了发信操作的情况下，能够缩短声音通信开始之前的时间。进而，在虽然是经过规定的时间之前、但无线通信终端 100 被放置到桌子上等的情况

下，通过回到通信系统 A 的待机状态，在用户进行发信操作的可能性变低的情况下成为在通信系统 A 中能够迅速起动数据通信的状态，能够提高使用方便性。

[0136] 此外，也可以将规定的终端状态设为“无线通信终端 100 具备的规定的应用被起动的状态”。在此情况下，终端状态检测部 109 例如由取得无线通信终端 100 具备的各种应用的起动状态的程序等构成。在此情况下，如果由终端状态检测部 109 检测到存储在无线通信终端 100 的存储部 107 中的规定的应用程序被起动，则控制部 112 在步骤 S219 中判断为“是”，进行通信系统 A 的捕捉处理。规定的应用程序是与声音通信无关的应用，例如是照相机的应用程序、电视的应用程序、浏览器的应用程序、邮件的应用程序等。另外，在通过用户操作明示地发出了通信系统 B 中的待机状态解除的指示的情况下也是同样的。此外，这里所说的应用程序的起动，不仅包括从最初起动应用程序的情况，还包括以步骤 S202 的声音通信开始指示为触发而再开始已中断的应用程序的执行、或在后台动作的应用程序开始动作的情况。

[0137] 这样，通过在通信系统 B 中的声音通话结束后的规定的时间处于通信系统 B 的待机状态，在规定的时间的期间用户进行了发信操作的情况下能够缩短声音通信开始之前的时间。进而，在虽然是经过规定的时间之前、但与声音通信无关的应用被起动的情况下，通过回到通信系统 A 的待机状态，在用户进行发信操作的可能性变低的情况下成为能够在通信系统 A 中迅速起动数据通信的状态，能够提高使用方便性。

[0138] 另外，“规定的终端状态”并不限定于以上例示的状态。此外，将以上例示的状态怎样组合都可以。例如，也可以在步骤 S219 中检测到无线通信终端 100 被闭合、或者检测到无线通信终端 100 的周围从明变化为暗的情况下转移到通信系统 A 的捕捉处理。

[0139] （实施方式 3）

[0140] 在上述实施方式 1 及 2 中，如果在声音通话结束后经过一定期间，则将通信系统 B 释放，但在用户进行了准备下一声音通话的规定的行为的情况下等，继续捕捉通信系统 B 反而效率更好。以下，说明在用户准备声音通话的情况下继续捕捉通信系统 B 的实施方式 3。

[0141] 另外，本实施方式中的无线通信系统 10 和无线通信终端 100 的结构分别与图 1 及图 2 所示的结构相同。

[0142] 此外，这些基本动作也与参照图 4A 及图 4B、图 5 说明的动作大致相同，以下，参照图 7 对无线通信终端 100 的动作的特征性的部分进行说明。

[0143] 在本实施方式中，也是控制部 112 进行图 4A 及图 4B 的步骤 S200 ～ S209 的处理，通过通信系统 B 进行声音通话。控制部 112 如果检测到通话结束 (S210 ：是)，则起动定时器 (S211)。

[0144] 在步骤 S211 中开始了计测的定时器没有到时的期间 (S212 ：否)，控制部 112 进行通信对方确定信息取得部 111 是否已被起动的判断处理 (S220)。通信对方确定信息取得部 111 已被起动的状态，例如是电话簿 (地址簿) 功能已被起动的状态、通过用户操作开始了发信电话号码的输入的状态、接入了 Web 上的电话号码数据库功能等的状态的某个或它们的组合等、用户进行了规定的行为的状态。在判断为通信对方确定信息取得部 111 已被起动的情况下 (8220 ：是)，等待已被起动的通信对方确定信息取得部 111 的处理结束 (S221)。在通信对方确定信息取得部 111 的处理已结束的情况下 (S221 ：是)，回到图 4B 的

S211，将定时器复位，重新开始计测。在判断为通信对方确定信息取得部 111 没有被起动的情况下（S220 ：否），无线通信终端 100 保持通信系统 B 中的待机状态（S214）。

[0145] 这样，在声音通话结束后经过规定的时间之前、电话簿功能等被起动的情况下，通过在该电话簿功能等的处理结束之前处于通信系统 B 的待机状态，在此期间用户进行了发信操作的情况下能够缩短声音通信开始之前的时间，能够提高使用方便性。

[0146] 另外，并不限于通话先信息取得部的起动以及通信对方信息的取得，也可以是，在检测到理解为用户开始了用于声音通话的处理的规定的行为的情况下，例如在检测到在无线通信终端 100 上连接了耳机的情况下，返回到图 4B 的步骤 S211。通过这样，在用户进行了发信操作的情况下能够缩短声音通信开始之前的时间，能够提高使用方便性。

[0147] （实施方式 4）

[0148] 根据已结束的声音通话的内容及种类的不同，有用户再开始声音通信的可能性较小、与维持捕捉了通信系统 B 的状态相比迅速切换到捕捉通信系统 A 的状态效率更好的情况。以下，说明对应于这样的情况的实施方式 4。

[0149] 另外，本实施方式中的无线通信系统 10 和无线通信终端 100 的结构分别与图 1 以及图 2 所示的结构相同。

[0150] 此外，它们的基本动作也与参照图 4A 及图 4B、图 5 说明的动作大致相同，以下，参照图 8 说明无线通信终端 100 的动作的特征性的部分。

[0151] 在本实施方式中，也是控制部 112 进行图 4A 及图 4B 的步骤 S200 ～ S209 的处理，通过通信系统 B 进行声音通话。控制部 112 如果检测到通话结束（S210 ：是），则经由第二无线通信关联信息取得部 110 取得与第二无线通信部 102 进行的无线通信关联的信息，控制部 112 基于该信息进行紧前的声音通话是否满足规定条件的判断处理（S222）。对于该判断处理在后面说明。

[0152] 在步骤 S222 中，在判断为满足规定条件的情况下（S222 ：是），定时器管理部 108 开始定时器的计时（S211）。如果经过规定的时间而定时器到期（S212 ：是），则进行通信系统 A 的捕捉处理（S213）。另一方面，在定时器没有到期的期间（S212 ：否），无线通信终端 100 保持通信系统 B 中的待机状态（S214）。

[0153] 另一方面，在步骤 S222 的判断处理中判断为不满足规定条件的情况下（S222 ：否），立即进行通信系统 A 的捕捉处理（S213）。

[0154] 这样，在通信系统 B 中的声音通话结束后，通常立即回到通信系统 A 的待机状态，成为能够在通信系统 A 中迅速起动数据通信的状态，仅在满足规定条件的情况下，使得在规定的时间的期间处于通信系统 B 的待机状态，由此，在规定的时间的期间用户进行了发信操作的情况下能够缩短声音通信开始之前的时间，能够提高使用方便性。

[0155] 这里，说明步骤 S222 的判断处理的具体例。

[0156] 作为相应于规定条件的例子，可以举出“紧前的声音通话的通话对方是无人值守电话网络服务的情况”。在此情况下，对无人值守电话网络服务打电话，在该通话结束之后对留下了无人值守电话消息的对方立即重新打电话的可能性较高。因此，在规定时间的期间保持通信系统 B 中的待机状态。在除此以外的情况下立即回到通信系统 A 的待机状态。作为另一例，可以举出“紧前的通话对方是事前登记的、经常相互打电话的组成员的情况”的例子。在此情况下，对组成员中的一个人打电话、在该通话结束后立即对同组的其他成员

重新打电话的可能性较高。因此，在规定时间的期间保持通信系统 B 中的待机状态。在除此以外的情况下立即回到通信系统 A 的待机状态。

[0157] 为了实现这些处理，例如，第二无线通信关联信息取得部 110 具有在第二无线通信部 102 的发信时保存通话对方信息的功能、在来信时保存由无线通信基站通知的通话对方信息的功能、将它们读出的功能等。此外，在存储部 107 中事前保存有事前确定的通话对方的信息。控制部 112 在步骤 S222 中判断第二无线通信关联信息取得部 110 取得的信息是否与记录在存储部 107 中的指定的通话对方信息一致，在一致的情况下判断为紧前的声音通话满足规定条件。

[0158] 这样，在通信系统 B 中的声音通话结束后，通常立即回到通信系统 A 的待机状态，成为能够在通信系统 A 中迅速起动数据通信的状态，仅在与指定的通话对方结束了通话时，在规定的时间的期间处于通信系统 B 的待机状态，由此在规定的时间的期间用户进行了发信操作的情况下能够缩短声音通信开始之前的时间，能够提高使用方便性。

[0159] 例如，在图 4B 的步骤 S209 中，也可以将不能正常地开始声音通话的情况判断为满足规定的条件。在此情况下，如果 S209 中的声音通话不成立，则用户立即对同一对方打电话、或对别的对方打电话的可能性较高，所以在规定的时间的期间保持通信系统 B 中的待机状态。在除此以外的情况下立即回到通信系统 A 的待机状态。在此情况下，第二无线通信关联信息取得部 110 是具有保存第二无线通信部 102 的发信处理的成功与否的功能、将其读出的功能等的处理部。控制部 112 在第二无线通信关联信息取得部 110 取得的声音通话成功与否信息表示声音通话不成立的情况下，判断为紧前的声音通话满足规定条件，前进到步骤 S211，在规定的时间的期间保持通信系统 B 中的待机状态。在除此以外的情况下立即回到通信系统 A 的待机状态。

[0160] 这样，在通信系统 B 中的声音通话结束后，通常立即回到通信系统 A 的待机状态，成为能够在通信系统 A 中迅速起动数据通信的状态，仅在紧前的声音通话不成立的情况下，使得在规定的时间的期间处于通信系统 B 的待机状态，由此，在规定的时间的期间用户进行了发信操作的情况下能够缩短声音通信开始之前的时间，能够提高使用方便性。

[0161] 此外，也可以是，在步骤 S209 的声音通话没有正常结束时，在步骤 S222 中判断为紧前的声音通话满足规定的“规定条件”。在声音通话没有正常结束的情况下，用户立即对同一对方打电话的可能性较高。因此，在声音通话没有正常结束的情况下，在规定的时间的期间保持通信系统 B 中的待机状态。在除此以外的情况下立即回到通信系统 A 的待机状态。在此情况下，第二无线通信关联信息取得部 110 由具有取得并保存第二无线通信部 102 的通信结束时的电波状况的功能、将其读出的功能等的处理部、或者由保存表示是否从无线通信基站接收到了正常结束通话通知的信息的功能、将其读出的功能等的处理部、或者由监视第二无线通信部 102 的通话状况（声音通话继续的状态还是无声状态）的功能、保存结束通话时点的通话状况的功能、将其读出的功能等的处理部等构成。此外，控制部 112 在第二无线通信关联信息取得部 110 取得的声音通话结束状态信息表示不是正常的通话结束的情况下，在步骤 S222 中判断为紧前的声音通话满足预定条件，在规定的时间的期间保持通信系统 B 中的待机状态。在除此以外的情况下立即回到通信系统 A 的待机状态。

[0162] 这样，在通信系统 B 中的声音通话结束后，通常立即回到通信系统 A 的待机状态，成为能够在通信系统 A 中迅速起动数据通信的状态，仅在紧前的声音通话异常结束的情况

下，使得在规定的时间的期间处于通信系统 B 的待机状态，由此，在规定的时间的期间用户进行了发信操作的情况下能够缩短声音通信开始之前的时间，能够提高使用方便性。

[0163] 另外，判断为紧前的声音通话满足规定的条件的条件是例示，也可以设定其他条件、或将上述条件适当组合等。例如，也可以是，在紧前的声音通话的通话对方已预先登记的情况、声音通话没有正常开始的情况、声音通话没有正常结束的情况中的某一个成立的情况下，判断为紧前的声音通话满足规定条件。

[0164] （实施方式 5）

[0165] 参照图 9 的流程图说明具备上述实施方式 2 ～实施方式 4 的全部功能的无线通信终端 100 的动作。

[0166] 另外，本实施方式中的无线通信系统 10 和无线通信终端 100 的结构分别与图 1 及图 2 所示的结构相同。

[0167] 首先，在本实施方式中，也是控制部 112 进行图 4A 及图 4B 的步骤 S200 ～ S209 的处理，通过通信系统 B 进行声音通话。

[0168] 接着，如果检测到通话结束 (S210 ：是)，则控制部 112 经由第二无线通信关联信息取得部 110 取得与第二无线通信部 102 进行的无线通信关联的信息，控制部 112 基于该信息进行紧前的声音通话是否满足规定条件的判断处理 (S222)。

[0169] 在通话目标不是指定的通话目标、并且将声音通话正常开始且结束前的情况下，且在判断为紧前的声音通话不满足规定条件的情况下 (S222 ：否)，立即进行通信系统 A 的捕捉处理 (S213)。

[0170] 另一方面，在因通话目标是指定的通话目标、或者不能正常开始声音通话、或者不能正常结束声音通话等的理由而判断为紧前的声音通话满足规定的条件的情况下 (S222 ：是)，控制部 112 使定时器管理部 108 开始定时器的计时 (S211)。如果定时器到时 (S212 ：是)，则进行通信系统 A 的捕捉处理 (S213)。

[0171] 另一方面，在步骤 S211 中开始了计测的定时器没有到时的期间 (S212 ：否)，控制部 112 基于用户是否进行了表示不进行声音通信的行为、例如基于终端状态检测部 109 检测到的值，进行是否成为了规定的终端状态的判断处理 (S219)。在判断为成为了规定的终端状态的情况下 (S219 ：是)，无线通信终端 100 不等待定时器的到时而转移到通信系统 A 的捕捉处理 (S213)。在判断为不是规定的终端状态的情况下 (S219 ：否)，控制部 112 进行用户是否开始了声音通信的准备、例如是否起动了通信对方确定信息取得部 111 的判断处理 (S220)。在判断为通信对方确定信息取得部 111 已起动的情况下 (S220 ：是)，等待已起动的通信对方确定信息取得部 111 的处理结束 (S221)。在通信对方确定信息取得部 111 的处理已结束的情况下 (S221 ：是)，回到步骤 S211，将定时器复位，重新开始计测。在判断为通信对方确定信息取得部 111 没有起动的情况下 (S220 ：否)，无线通信终端 100 保持通信系统 B 中的待机状态 (S214)。

[0172] 这里，在接收到了声音通信开始指示的情况下 (S215 ：是)，回到步骤 S207，对通信系统 B 的小区发送发信请求。如果没有接收到声音通信开始指示 (S215 ：否)，则回到定时器是否到时的判断处理 (S212)。另外，步骤 S219 的判断处理、和步骤 S220 的判断处理的顺序也可以相反。

[0173] 通过进行上述那样的处理，在连续进行声音通信动作时，能够缩短声音通信开始

之前的时间，能够提高使用方便性。此外，在此期间，由于不需要发送 S217 的 CSFB 结束通知和 S203 的 CSFB 开始通知，所以还能够节约无线资源。

[0174] 另外，本发明并不限定于上述实施方式，当然包括在其技术范围内能够做出的各种变更、改良。例如，图 1 及图 2 所示的无线通信系统的结构及无线通信终端的功能结构也可以包括图 1 及图 2 所示的结构要件以外的结构要素，根据情况，也可以与图 1 及图 2 所示的结构不同。例如，也可以将定时器管理部 108、第二无线通信关联信息取得部 110、通信对方确定信息取得部 111 等作为控制部 112 的功能的一部分。此外，可以将终端状态检测部 109 的终端状态的条件及第二无线通信关联信息取得部 110 的规定的条件等进行各种组合，作为声音通信系统的捕捉状态的继续条件。

[0175] 上述实施方式 1 ～ 5 并不需要全部组合，可以适当组合而使用。此外，也可以将用来使控制部 112 执行上述动作的动作控制程序例如记录在记录介质中、或经由网络分发、或保存到存储部 107 中。

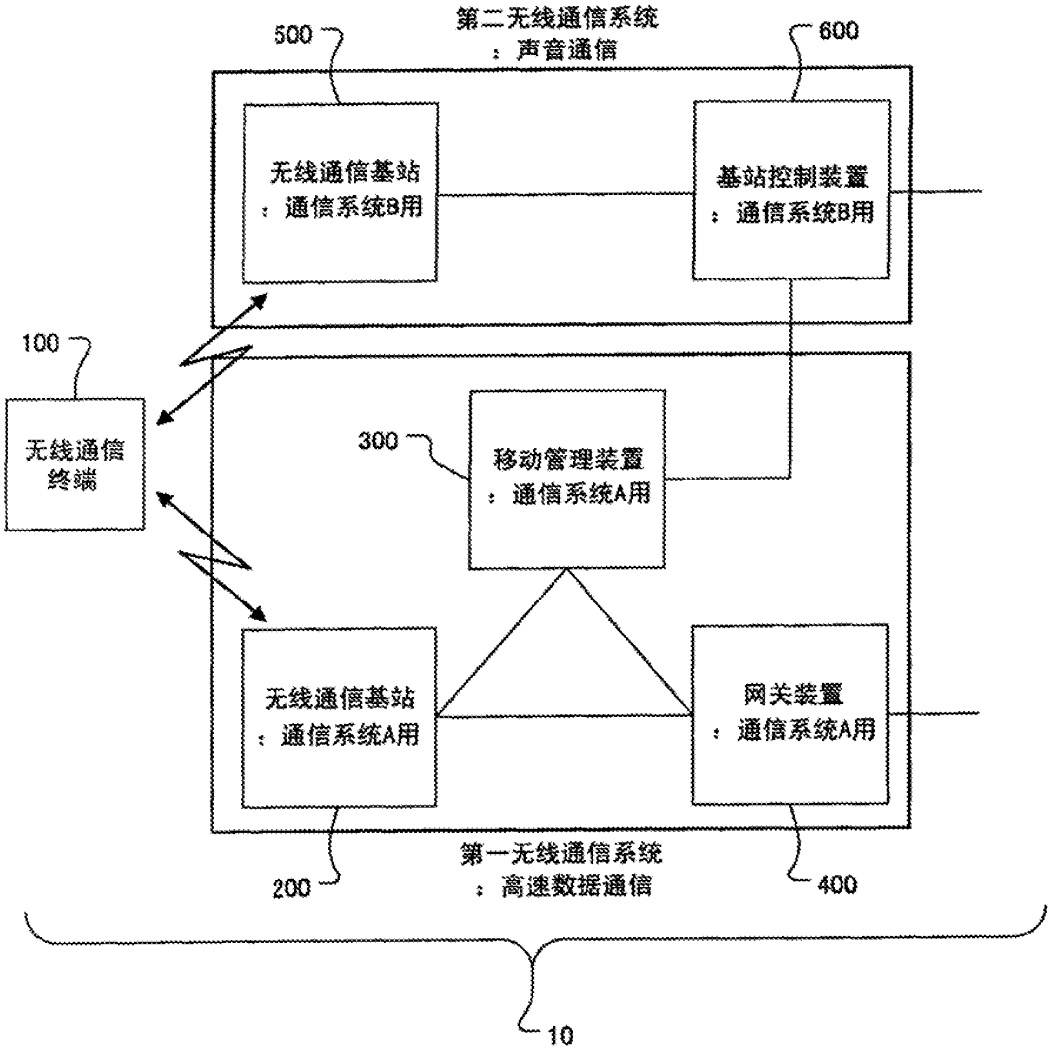

第二无线通信系统
：声音通信
500
600
无线通信基站
：通信系统B用
基站控制装置
：通信系统B用
100
无线通信
终端
300
移动管理装置
：通信系统A用
无线通信基站
：通信系统A用
网关装置
：通信系统A用
第一无线通信系统
：高速数据通信
200
400
10

图 1

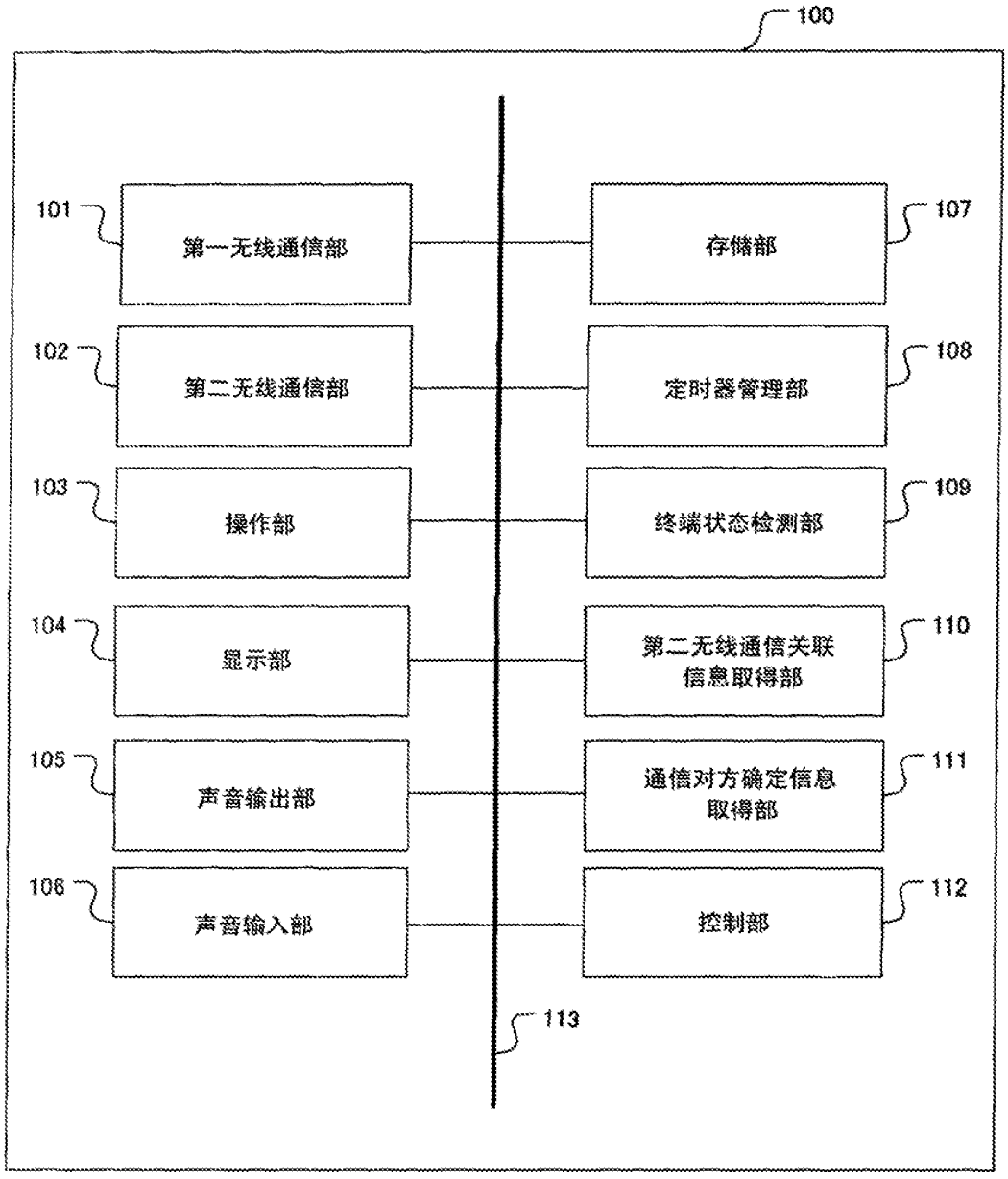

100
101
第一无线通信部
102
第二无线通信部
103
操作部
104
显示部
105
声音输出部
106
声音输入部
107
存储部
108
定时器管理部
109
终端状态检测部
110
第二无线通信关联信息取得部
111
通信对方确定信息取得部
112
控制部
113

图 2

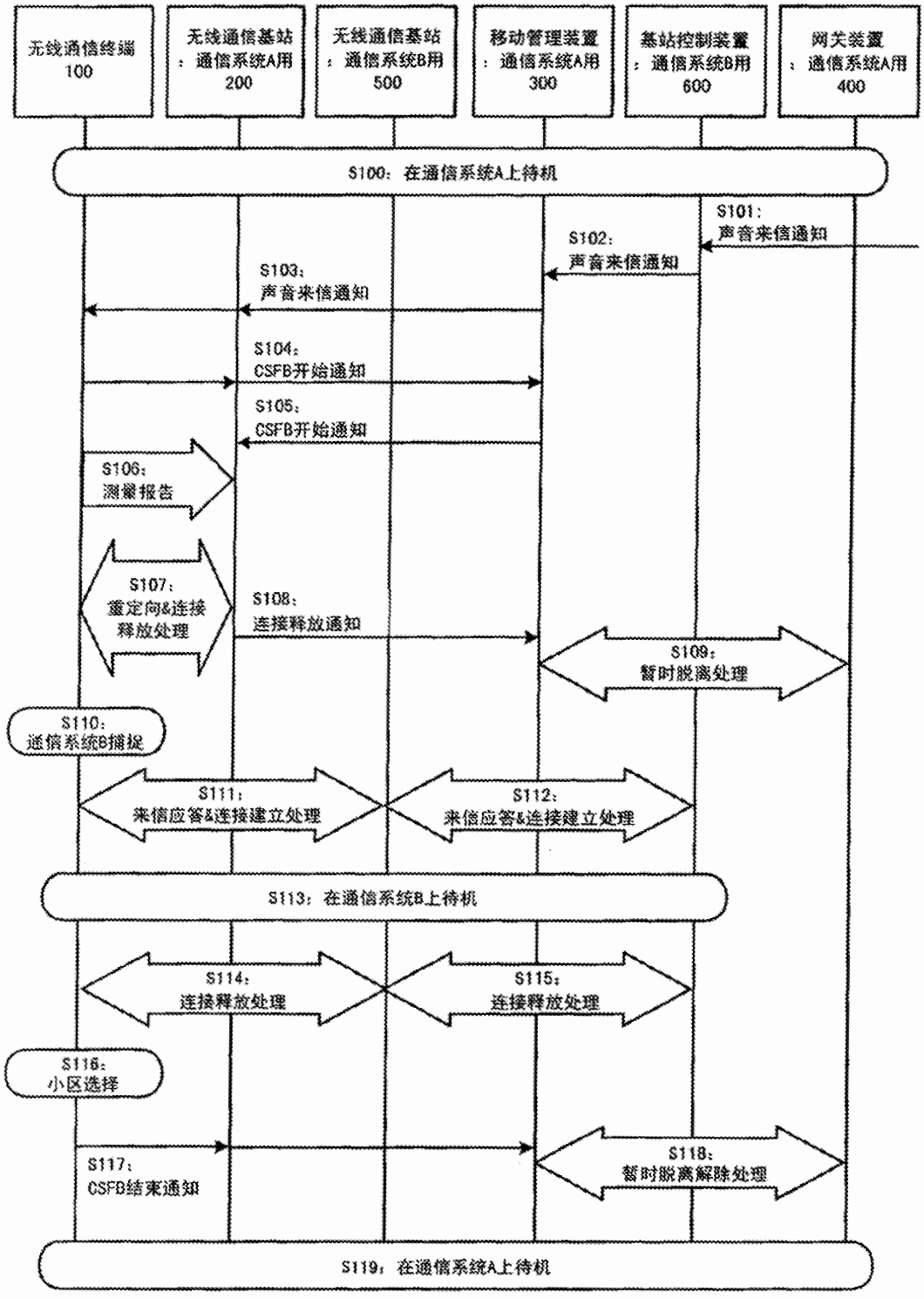

无线通信终端 100
无线通信基站：通信系统A用 200
无线通信基站：通信系统B用 500
移动管理装置：通信系统A用 300
基站控制装置：通信系统B用 600
网关装置：通信系统A用 400
S100：在通信系统A上待机
S101：声音来信通知
S102：声音来信通知
S103：声音来信通知
S104：CSFB开始通知
S105：CSFB开始通知
S106：测量报告
S107：鉴定向&连接释放处理
S108：连接释放通知
S109：暂时脱离处理
S110：通信系统B捕捉
S111：来信应答&连接建立处理
S112：来信应答&连接建立处理
S113：在通信系统B上待机
S114：连接释放处理
S115：连接释放处理
S116：小区选择
S117：CSFB结束通知
S118：暂时脱离解除处理
S119：在通信系统A上待机

图 3

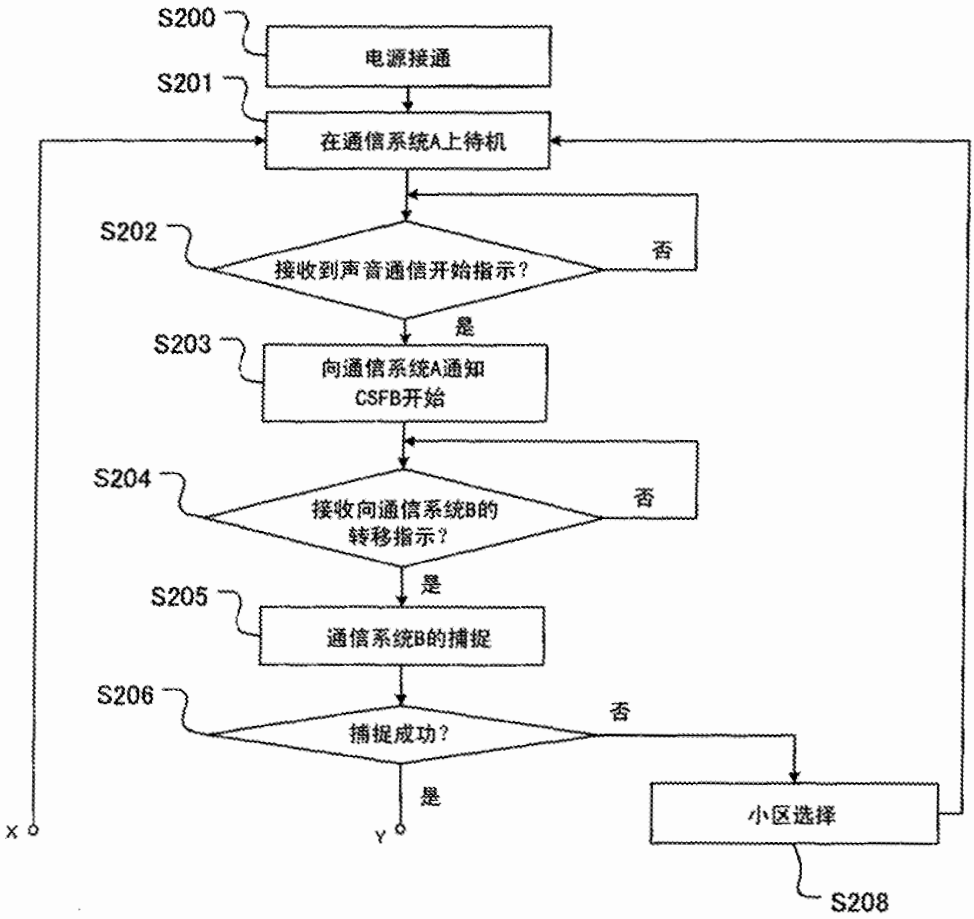

S200
电源接通
S201
在通信系统A上待机
S202
接收到声音通信开始指示？
否
是
S203
向通信系统A通知
CSFB开始
S204
接收向通信系统B的
转移指示？
否
是
S205
通信系统B的捕捉
S206
捕捉成功？
否
是
小区选择
S208
X
Y

图 4A

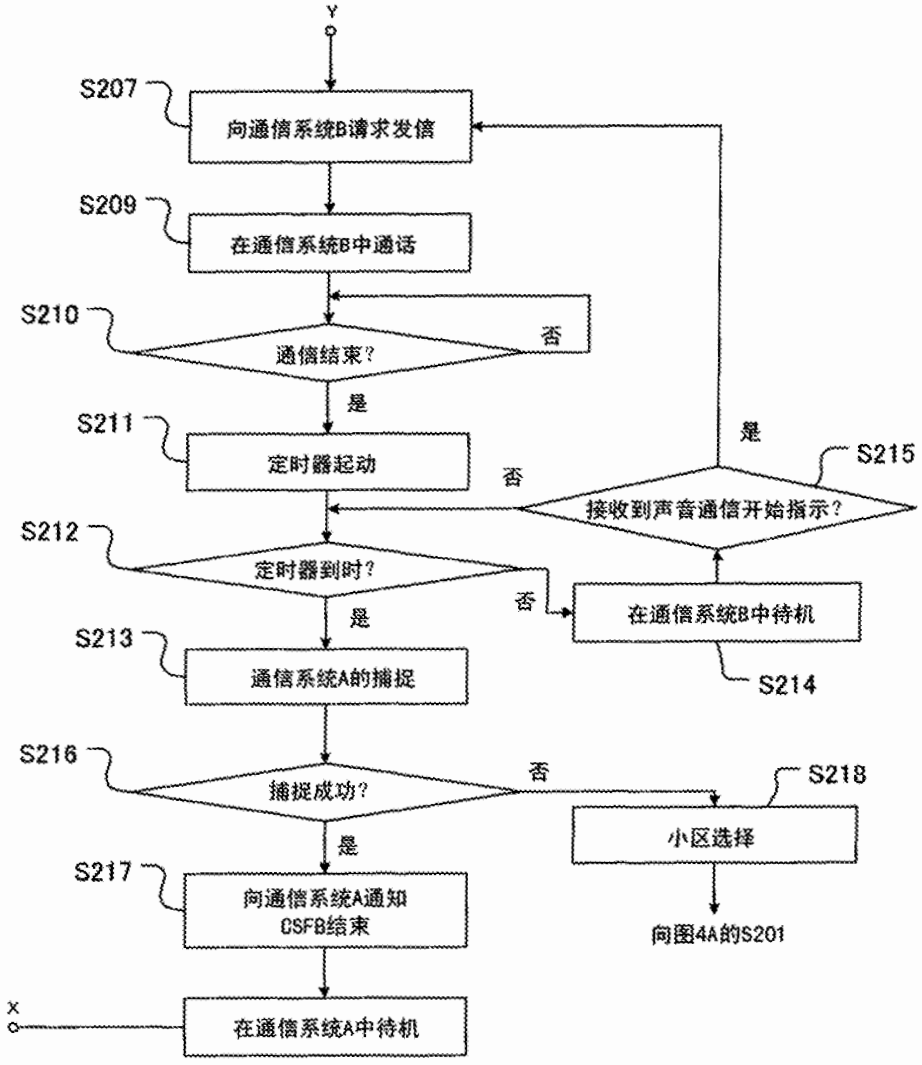

Y
S207
向通信系统B请求发信
S209
在通信系统B中通话
S210
通信结束?
否
是
S211
定时器起动
S212
定时器到时?
否
是
S213
通信系统A的捕捉
S214
在通信系统B中待机
S215
接收到声音通信开始指示?
是
否
S216
捕捉成功?
否
是
S217
向通信系统A通知
CSFB结束
S218
小区选择
向图4A的S201
X
在通信系统A中待机

图 4B

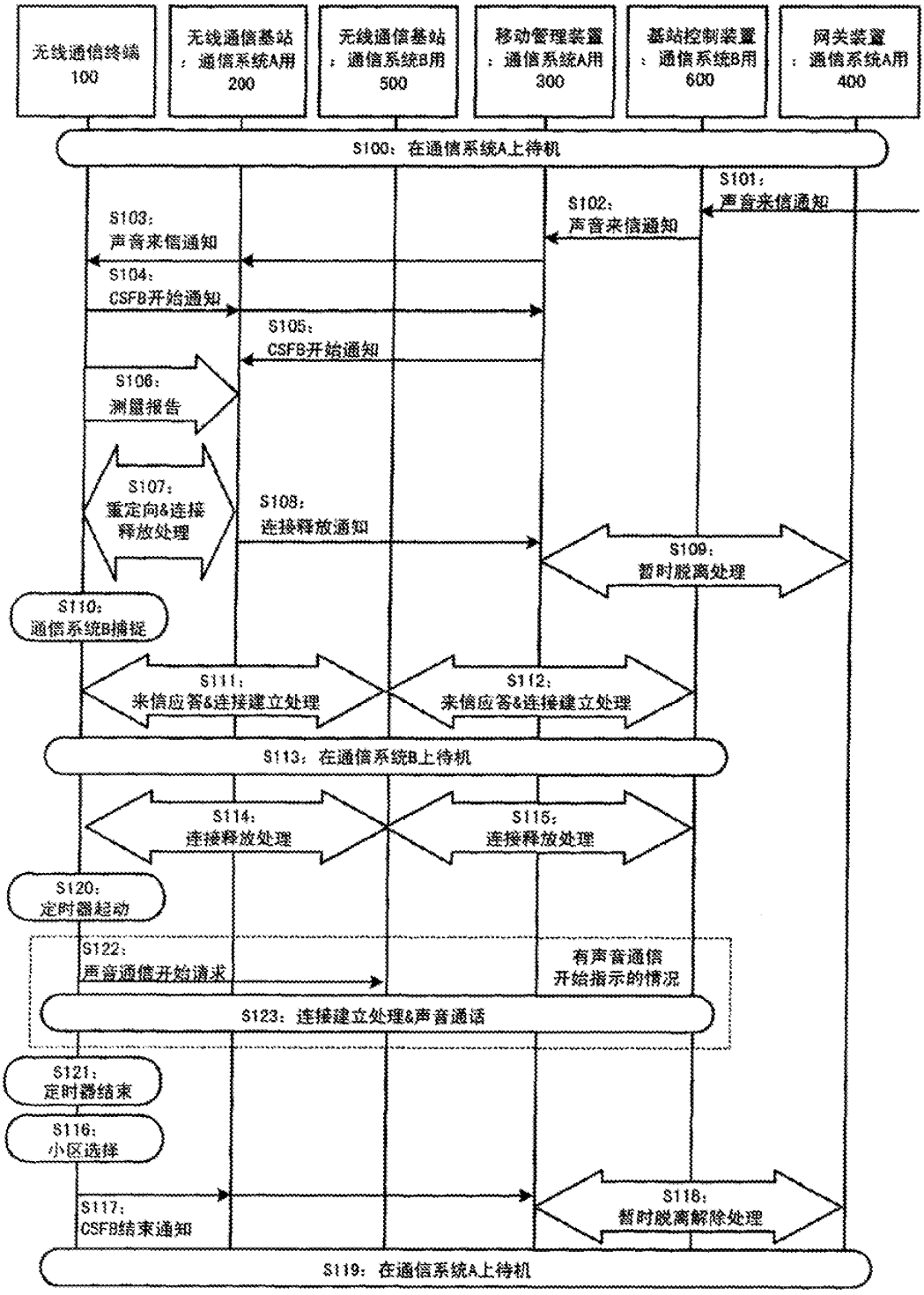

无线通信终端 100
无线通信基站：通信系统A用 200
无线通信基站：通信系统B用 500
移动管理装置：通信系统A用 300
基站控制装置：通信系统B用 600
网关装置：通信系统A用 400
S100：在通信系统A上待机
S101：声音来信通知
S102：声音来信通知
S103：声音来信通知
S104：CSFB开始通知
S105：CSFB开始通知
S106：测量报告
S107：重定向&连接释放处理
S108：连接释放通知
S109：暂时脱离处理
S110：通信系统B捕捉
S111：来信应答&连接建立处理
S112：来信应答&连接建立处理
S113：在通信系统B上待机
S114：连接释放处理
S115：连接释放处理
S120：定时器起动
S122：声音通信开始请求
有声音通信开始指示的情况
S123：连接建立处理&声音通话
S121：定时器结束
S116：小区选择
S117：CSFB结束通知
S118：暂时脱离解除处理
S119：在通信系统A上待机

图 5

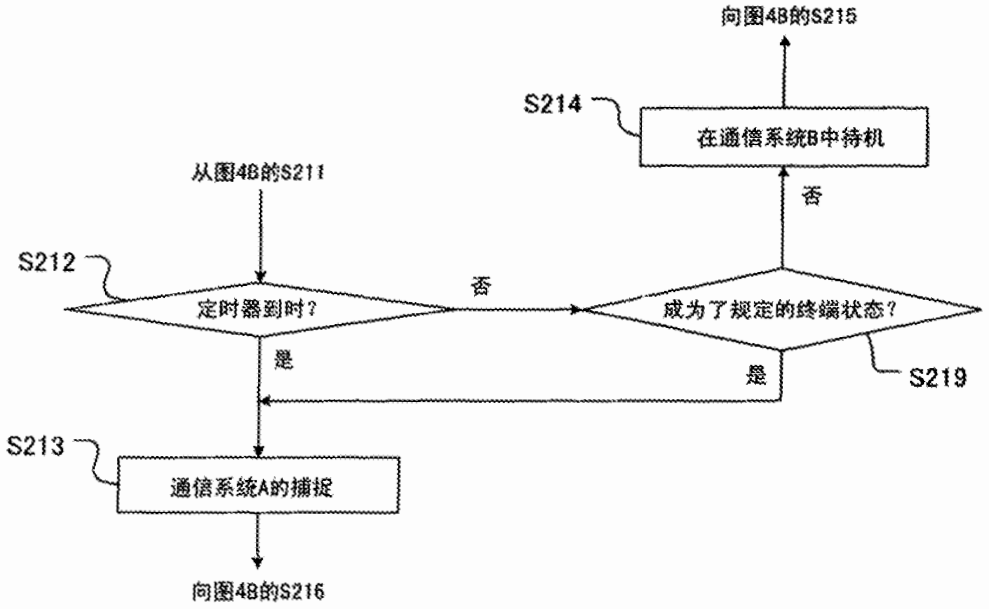

向图4B的S215
S214
在通信系统B中待机
从图4B的S211
否
S212
定时器到时?
否
成为了规定的终端状态?
是
是
S219
S213
通信系统A的捕捉
向图4B的S216

图 6

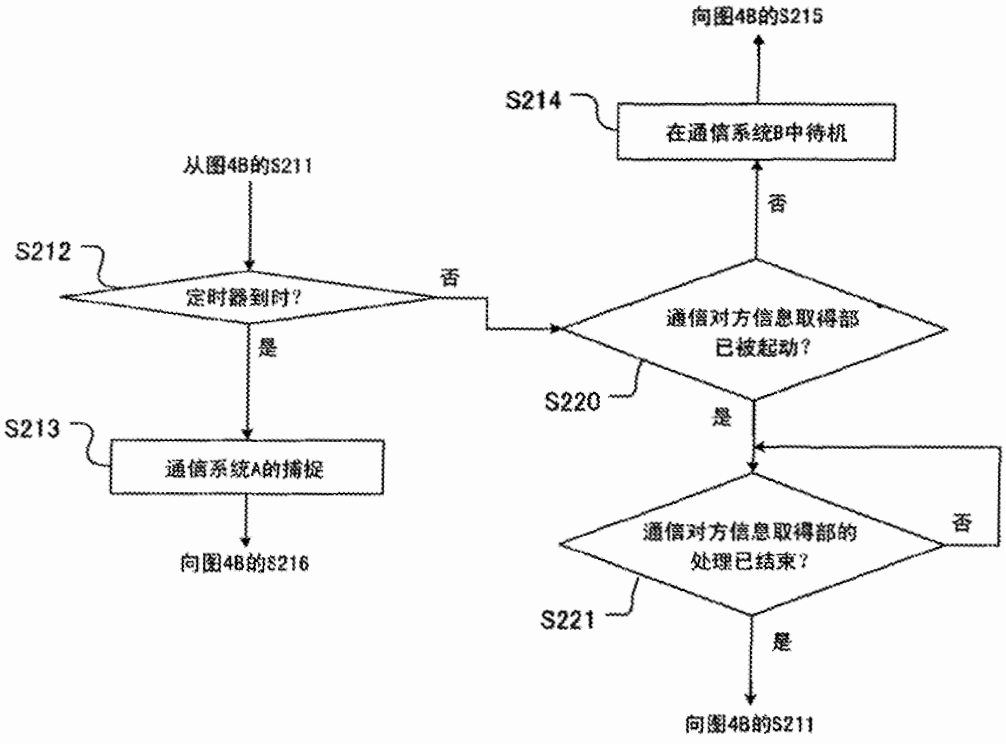

向图4B的S215
S214
在通信系统B中待机
从图4B的S211
否
S212
定时器到时?
否
通信对方信息取得部
已被起动?
是
S220
S213
通信系统A的捕捉
是
通信对方信息取得部的
处理已结束?
否
S221
是
向图4B的S216
向图4B的S211

图 7

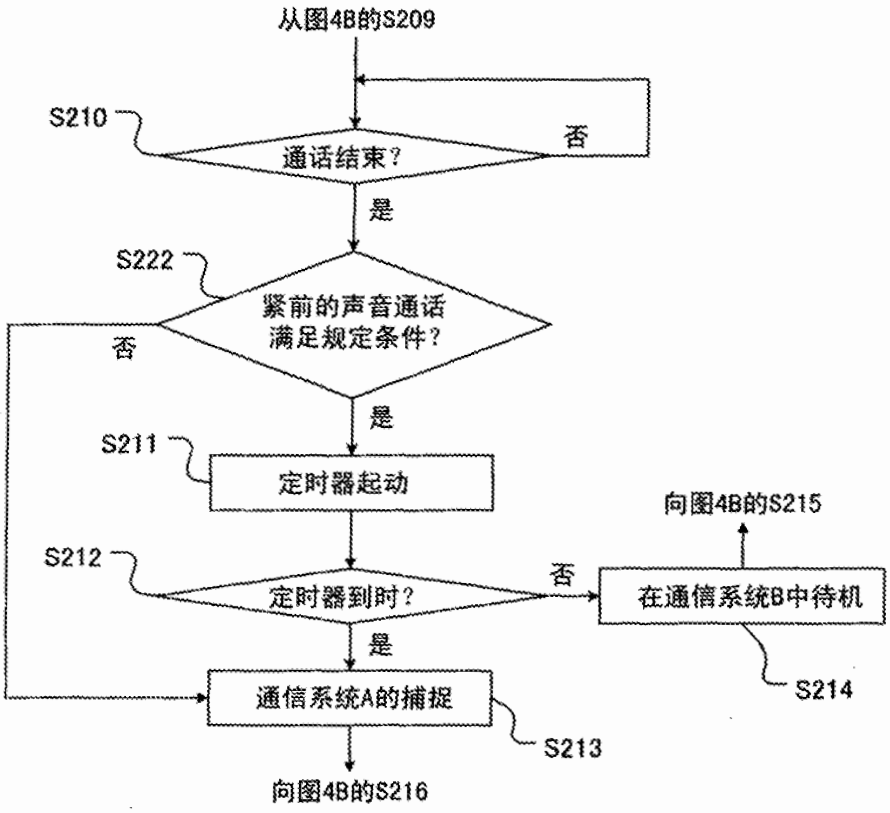

从图4B的S209
S210
通话结束？
否
是
S222
紧前的声音通话
满足规定条件？
否
是
S211
定时器起动
S212
定时器到时？
否
是
向图4B的S215
在通信系统B中待机
S214
通信系统A的捕捉
S213
向图4B的S216

图 8

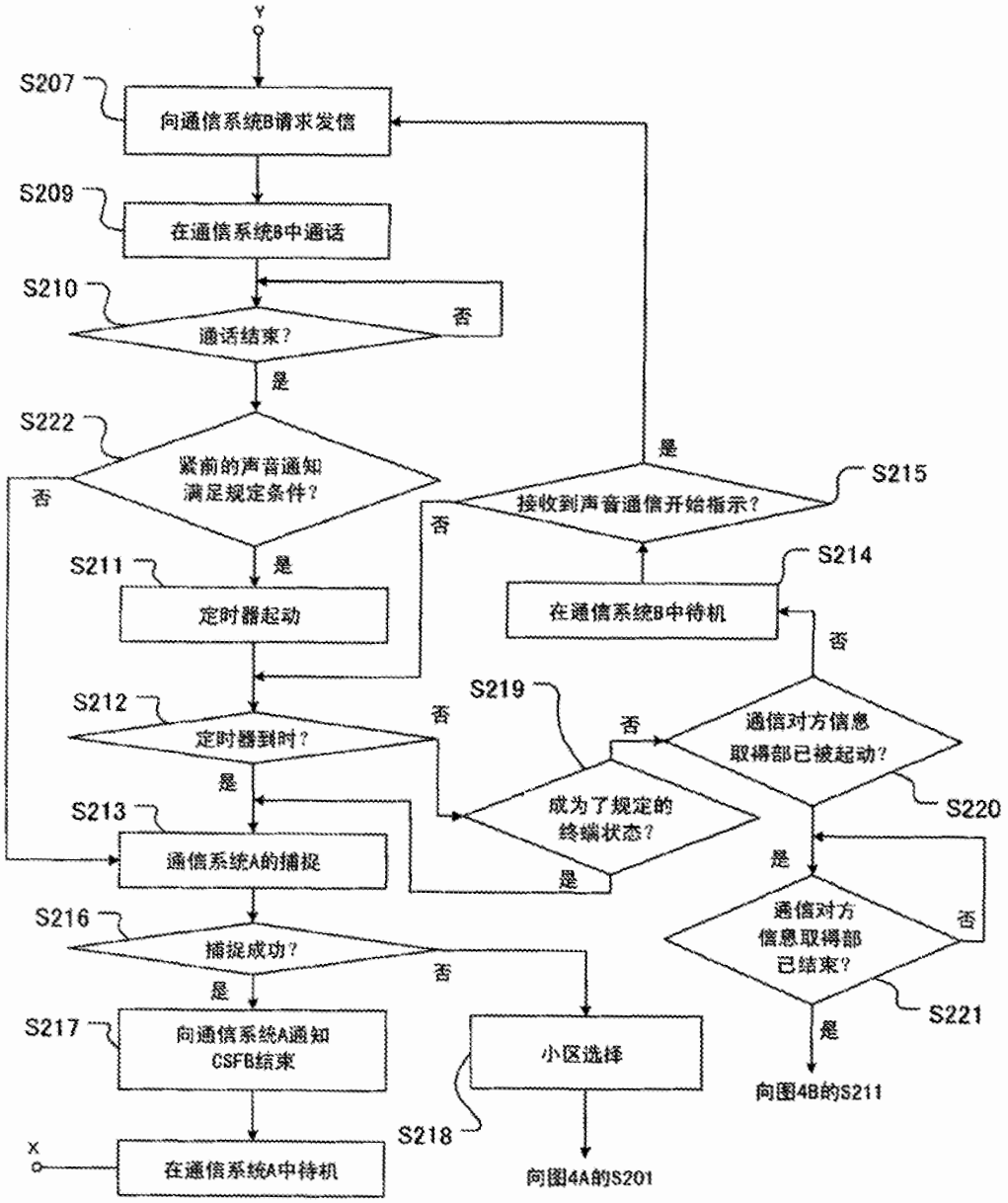

Y
S207
向通信系统B请求发信
S209
在通信系统B中通话
S210
通话结束?
否
是
S222
紧前的声音通知
满足规定条件?
否
是
S211
定时器起动
S212
定时器到时?
否
是
S213
通信系统A的捕捉
S216
捕捉成功?
否
是
S217
向通信系统A通知
CSFB结束
X
在通信系统A中待机
S218
小区选择
向图4A的S201
S215
接收到声音通信开始指示?
是
否
S214
在通信系统B中待机
否
S219
通信对方信息
取得部已被起动?
否
是
成为了规定的
终端状态?
是
S220
通信对方
信息取得部
已结束?
否
是
S221
是
向图4B的S211

图 9

Electronic Acknowledgement Receipt

EFS ID:	27998146
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Customer Number:	23364
Filer:	Thomas Lee
Filer Authorized By:	
Attorney Docket Number:	BEEL3004/BEU/TL
Receipt Date:	06-JAN-2017
Filing Date:	03-MAR-2015
Time Stamp:	16:57:14
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	BEEL3004_IDS_SB08.pdf	613096 6a9a39ead298203ad7d45f820580e0c1961b7570	no	5

Warnings:

Information:					
2	Non Patent Literature	BEEL3003_NFOA_06OCT16.pdf	707921 fd3b531becf4ad6d36bd008b6b09433fd9f6d928	no	17
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Information:					
3	Non Patent Literature	BRAN3005_FOA_02NOV16.pdf	445839 19fbe334d7e1d9d7510ccc3e94b834ca5057d2e1	no	13
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6	Non Patent Literature	EP_SR_03NOV16.pdf	700384 7b0cb4f3cb3989702dbdab0d8528a984d3059d22	no	9
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Information:					
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9	Foreign Reference	CN1476242A_filing.pdf	21093996 2fbfce9802ff048256808617c9345030d725c043	no	85
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Information:					
11	Foreign Reference	CN101454762B_filing.pdf	3617564 5a66e2afc9ef097a30daba2002b999551a4c8ab8	no	13
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New International Application Filed with the USPTO as a Receiving Office

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(Not for submission under 37 CFR 1.99)

Application Number	14344836
Filing Date	2015-03-03
First Named Inventor	Koen Simon Herman BEEL
Art Unit	2184
Examiner Name	Eric T. Oberly
Attorney Docket Number	BEEL3004/BEU/TL

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	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	Eric T. Oberly
	Attorney Docket Number	BEEL3004/BEU/TL

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	European Office Action dated August 1, 2016, for EP 12762258.7.	
	2	U.S. Office Action dated June 17, 2016, for 14/278,442.	
	3	U.S. Office Action dated June 17, 2016, for 14/725,401.	

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Examiner Signature		Date Considered	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	Eric T. Oberly
	Attorney Docket Number	BEEL3004/BEU/TL

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2016-09-19
Name/Print	THOMAS LEE	Registration Number	66396

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

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8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	26962168
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Customer Number:	23364
Filer:	Thomas Lee/Kaitlyn Miller
Filer Authorized By:	Thomas Lee
Attorney Docket Number:	BEEL3004/BEU/TL
Receipt Date:	19-SEP-2016
Filing Date:	03-MAR-2015
Time Stamp:	16:01:08
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	EP_OA_01AUG16.pdf	89864 cc1c05c2358d7ba614f7394488ed41c3a1ed88ea	no	4

Warnings:

Information:					
2	Non Patent Literature	BEEL3001C_NFOA_17JUN16.pdf	1387715 474b37c54b00dc0217f5ab507bade67fe6f0723d	no	33
Warnings:					
Information:					
3	Non Patent Literature	BEEL3002CIPC_NFOA_17JUN16.pdf	1265510 8d74212f7612be277b2ed2e6b3b1aa68dee13a9a	no	30
Warnings:					
Information:					
4	Information Disclosure Statement (IDS) Form (SB08)	BEEL3004_IDS_SB08_filing.pdf	612223 5128d69fcd4adfbef09efc5b08701c2ec94ffdc9	no	4
Warnings:					
Information:					
		Total Files Size (in bytes):	3355312		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	14344836
Filing Date	2015-03-03
First Named Inventor	Koen Simon Herman BEEL
Art Unit	2184
Examiner Name	Heny Tsai
Attorney Docket Number	BEEL3004/BEU/TL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20110023096	A1	2011-01-27	XIAO et al.	cited in Office Action
	2	20070033289	A1	2007-02-08	NUYTTENS et al.	
	3	20140082227	A1	2014-03-20	BEEL et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

EFS Web 2.1.17

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	Heny Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

If you wish to add additional Foreign Patent Document citation information please click the Add button [Add]

NON-PATENT LITERATURE DOCUMENTS [Remove]

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	US Office Action dated March 29, 2016, for 14/395,364.	
	2	Marc AL-HAMES et al., Audio-Visual Processing in Meetings: Seven Questions and Current AMI Answers, 2006.	
	3	Mood indicators on electronic meeting tools" IBM, IP.com number: IPCOMOOOO1171D, Publication Date: March 12, 2003.	

If you wish to add additional non-patent literature document citation information please click the Add button [Add]

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	Heny Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2016-05-25
Name/Print	THOMAS LEE	Registration Number	66396

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Electronic Acknowledgement Receipt	
EFS ID:	25872673
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Customer Number:	23364
Filer:	Thomas Lee/Kaitlyn Miller
Filer Authorized By:	Thomas Lee
Attorney Docket Number:	BEEL3004/BEU/TL
Receipt Date:	25-MAY-2016
Filing Date:	03-MAR-2015
Time Stamp:	15:01:28
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	BRAN3005_NFOA_29MAR16.pdf	899434 c2921b693aeaee1f5012de64c572ad51790575ec	no	26
Warnings:					
Information:					

2	Non Patent Literature	MoodIndicators_NPL_filing.pdf	1008008 61f1e08f4ed00cbcc256bc31265719ff11e2dcf5	no	2
Warnings:					
Information:					
3	Non Patent Literature	Al_Hames_NPL.pdf	125223 18ccbfad29119358d744933787581c9bfd1891ce	no	12
Warnings:					
Information:					
4	Information Disclosure Statement (IDS) Form (SB08)	BEEL3004_IDS_SB08.pdf	612385 cba0db1f465acc429e6d062872e0950e35b2b32f	no	4
Warnings:					
Information:					
		Total Files Size (in bytes):	2645050		

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<u>New Applications Under 35 U.S.C. 111</u>
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<u>National Stage of an International Application under 35 U.S.C. 371</u>
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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	Dean Phan
	Attorney Docket Number	BEEL3004/TJM/TL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2007/137415	WO	A1	2007-12-06	SMART TECH INC	cited in EP Office Communication	

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

EFS Web 2.1.17

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	Dean Phan
	Attorney Docket Number	BEEL3004/TJM/TL

	1	European Office Communication dated December 21, 2015, for EP 12762258.7.	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Filing Date	2015-03-03
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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas J. Moore/	Date (YYYY-MM-DD)	2016-02-04
Name/Print	THOMAS J. MOORE	Registration Number	28974

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
6 December 2007 (06.12.2007)

PCT

(10) International Publication Number
WO 2007/137415 A1

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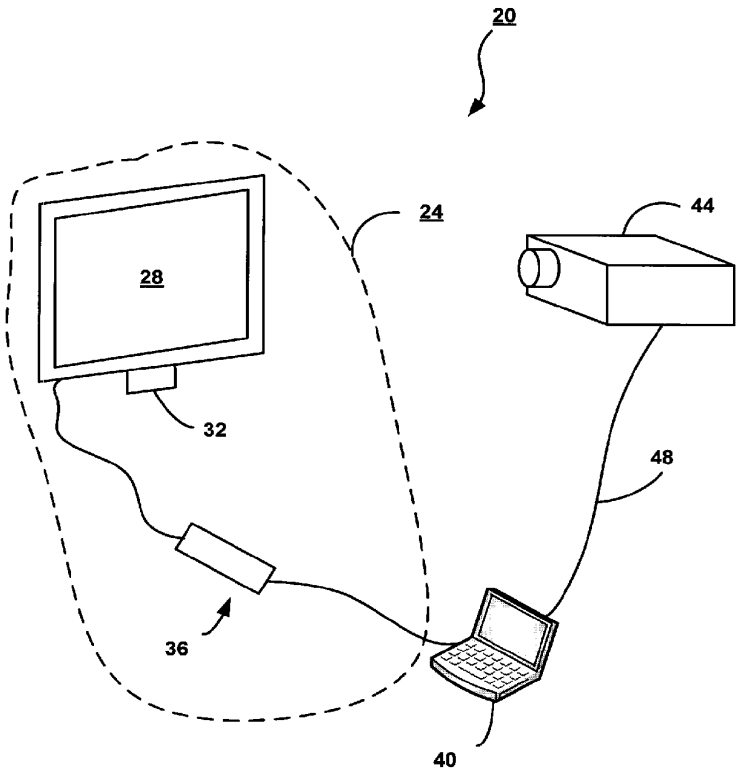
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[Continued on next page]

(54) Title: PLUG AND PLAY PERIPHERAL STORING DRIVER



(57) Abstract: A plug-and-play device providing a set of functionality comprises a plug-and-play interface, storage, and software stored in the storage. The software is automatically executed by a computer when the plug-and-play device is connected thereto via the plug-and-play interface. The software detects disconnection of the plug-and-play device from the computer and terminates its execution in response thereto. The computer does not persistently store the software thereafter.

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PLUG AND PLAY PERIPHERAL STORING DRIVER

Field of the Invention

[0001] The present invention relates generally to computer peripheral devices and more specifically, to a plug-and-play device and a method of using the same.

Background of the Invention

[0002] Plug-and-play devices are well known and many types of plug-and-play standards exist, including universal serial bus ("USB"), IEEE1394 ("FireWire") and PCMCIA ("PC Card"), with the most common being USB. Such plug-and-play devices have a set of functionality that is accessible to a computer through a plug-and-play interface. This functionality can include, but is not limited to, storage, input registration, image capturing, audio input and output, etc. Many sets of functionality are defined as device classes. Upon connection of a plug-and-play device to a computer, an electronic circuit is completed and the operating system of the computer is alerted of the connection. The operating system polls the plug-and-play device to determine what functionality is available on the plug-and-play device.

[0003] Many operating systems possess a number of pre-loaded drivers for generic plug-and-play device classes, such as USB mass storage, a two-button mouse, etc. If the operating system is in possession of a driver for the device class of the plug-and-play device connected to the computer, the driver is loaded by the computer so that the functionality of the plug-and-play device can be accessed. If, instead, the operating system does not possess a driver for the device class of the plug-and-play device, the operating system in many cases prompts the user to install the appropriate software to enable the computer to access the functionality of the plug-and-play device.

[0004] U.S. Patent Application Publication No. 2004/0205778 to Wong *et al.* discloses a peripheral device that includes driver storage. The peripheral device connects to a computer via a plug-and-play interface and cycles through

the emulation of a number of plug-and-play device classes recognized by the operating system of the computer until one is found that permits auto-execution of a driver installation program.

[0005] U.S. Patent Application Publication No. 2005/0038934 to Gotze *et al.* discloses a USB-based peripheral printer that can be conditioned between two modes. In a first mode, the printer emulates USB mass storage to permit installation of drivers stored in memory of the printer onto a computer to which the printer is connected. Once the drivers are installed, the printer is conditioned into a second mode, in which it behaves as a printer. The drivers installed on the computer enable printing on the printer.

[0006] Plug-and-play devices may take other forms. For example, the plug-and-play device may be in the form of a touch panel that detects touch input and provides corresponding output to a computer to which the touch panel is connected. In order for the computer to interpret the touch panel output properly, a calibration process needs to be performed in order to map the coordinate system of the touch panel input field to the computer display coordinate system. After the calibration process has been performed, the resulting calibration settings are stored by the computer so that the touch panel output can be correctly mapped to the computer display coordinate system. As will be appreciated however, the calibration settings are particular to the computer. If the touch panel is plugged into another computer, the calibration process must be re-performed.

[0007] The need to install software/drivers can be undesirable in a number of situations, such as where a user does not possess administrative rights for the computer or simply does not desire to install yet more software on the computer, especially where the connection of the plug-and-play device is infrequent or a one-time affair. Installing software may also prove to be a difficult or complicated task. For example, the user may need to download software from the Internet or may need to locate media upon which the software/drivers are located.

[0008] It is therefore an object of the present invention to provide a novel plug-and-play device and method of using the same.

Summary of the Invention

[0009] Accordingly, in one aspect there is provided a plug-and-play device providing a set of functionality, comprising:

a plug-and-play interface;

storage; and

software stored in said storage, said software being automatically executed by a computer when said plug-and-play device is connected thereto via said plug-and-play interface, said software being operable to detect disconnection of said plug-and-play device from said computer and terminate its execution in response thereto, said computer not persistently storing said software thereafter.

[0010] In one embodiment, the software enables the computer to access the set of functionality provided by the plug-and-play device. The plug-and-play interface can be a universal serial bus interface. The storage can store an autorun.inf file that specifies the software for execution. The software can be copied to a temporary location on the computer and executed therefrom, and can be terminated and deleted upon disconnection of the plug-and-play device from the computer.

[0011] According to another aspect, there is provided a method of using a plug-and-play device with a computer, comprising:

detecting connection of a plug-and-play device to said computer;

automatically locating software specified for execution, said software being stored in memory of said plug-and-play device;

executing said software with said computer; and

terminating execution of said software upon disconnection of said plug-and-play device from said computer.

[0012] According to yet another aspect, there is provided a plug-and-play device, comprising:

storage; and

settings stored in said storage, said settings being associated with a set of functionality.

[0013] The plug-and-play device can further include software stored in the storage, the software providing access to the set of functionality when the plug-and-play device is connected to a computer. The set of functionality in this case is an input interface provided by the plug-and-play device.

[0014] Alternatively, the plug-and-play device can include software stored in the storage, the software being executable on a computer to which the plug-and-play device is connected and providing access to the set of functionality. The software can reference the settings during execution. The software can be automatically executed by the computer when the plug-and-play device is connected thereto via a plug-and-play interface thereof, with the software detecting disconnection of the plug-and-play device from the computer and terminating execution in response thereto. In this case, the computer does not persistently store the software thereafter.

[0015] According to yet another aspect, there is provided a plug-and-play device for receiving input, comprising:

a plug-and-play interface;

a touch panel on which a computer-generated image is displayed;

storage; and

calibration settings stored in said storage and mapping touch panel an computer-generated image coordinate systems.

[0016] According to still yet another aspect, there is provided a plug-and-play device providing a set of functionality, comprising:

a plug-and-play interface;

storage; and

software stored in said storage, said software being copied to said computer and executed therefrom automatically when said plug-and-play device is connected to said computer, said software providing access to said set of functionality of said plug-and-play device.

[0017] By storing software for the plug-and-play device on the plug-and-play device itself that automatically loads onto the computer when the plug-and-play device is connected to the computer, the user of the plug-and-play device

need not pre-install software/drivers on the computer in order to access the functionality offered by the plug-and-play device nor does the user require administrative rights for the computer in order to use the software. As the software is not stored persistently on the computer upon termination, the computer is left in the same general state as it was in before connection to the plug-and-play device. Further, by storing settings on the plug-and-play device, a setup process need not be performed when a new computer is connected to the plug-and-play device.

Brief Description of the Drawings

[0018] Embodiments will now be described more fully with reference to the accompanying drawings in which:

Figure 1 shows a plug-and-play device comprising a touch panel, a controller and a cable, coupled to a computer;

Figure 2 shows a schematic diagram of the cable of Figure 1; and

Figure 3 is a flow chart of the general operation of the plug-and-play device of Figure 1.

Detailed Description of the Embodiments

[0019] Figure 1 illustrates a system 20 comprising a plug-and-play device 24 for receiving and digitizing input. In this embodiment, the plug-and-play device 24 comprises a touch panel 28, a controller 32 and a cable 36. Touch panel 28 is of the type manufactured and sold by SMART Technologies, Inc. of Calgary, Alberta under the name SMARTBoard™. The controller 32 controls the operation of the touch panel 28 and is in communication with a computer 40 via the cable 36. An LCD projector 44 is coupled to the computer 40 via a VGA cable 48. The computer 40 controls the LCD projector 44 to project images otherwise presented on a display of the computer 40 onto the touch panel 28. The projector 44 may be positioned in front of or behind the touch panel 28.

[0020] The touch panel 28 provides a user with the ability to interact with the projected images via a pointer, such as a pen tool or a finger, for the purpose of providing input. The touch panel 28 requires no extra software other than that provided by the operating system of the computer 40 to work as a mouse. The functionality of the touch panel 28 is greatly enhanced by additional software not available on the operating system, as will be described below.

[0021] The controller 32 comprises a processor (not shown) that executes firmware stored in non-volatile storage. Generally, the firmware causes the controller 32 to operate in one of two operational modes. In an initial mode, the controller 32 operates two USB profiles, namely an absolute mouse human interface device ("HID") profile and a SMARTBoard HID profile. The absolute mouse HID profile allows the controller 32 to relay absolute position information in response to pointer input, as it is detected by the touch panel 28, along with basic mouse functions. The SMARTBoard HID is a proprietary device class that enables enhanced functionality for the touch panel 28. The enhanced functionality includes all of the functionality available in the absolute mouse HID device class, plus inking information, additional tool information (buttons, eraser, pen tool selection, etc.) and two-way communications with the controller 32. In a "native" operating mode, the controller 32 terminates the absolute mouse HID profile and only operates the SMARTBoard HID profile.

[0022] The components of the cable 36 are described with reference to Figure 2. The cable 36 comprises a USB hub component 52 that has a first USB interface 56 for connection to a USB cable 60 extending to the touch panel 28, and a second USB interface 64 for connection to a USB cable 68 extending to the computer 40. Both the first and second USB interfaces 56, 64 are in communication with a USB hub 72.

[0023] Also in communication with the USB hub 72 is storage 76, namely flash memory, that is configured to operate in accordance with the compact disk ("CD") HID profile. The CD HID profile enables storage 76 to behave like a CD drive. Storage 76 stores a set of software applications,

including a user application (SMARTBoardTools.exe), a service (SMARTBoardService.exe), a launcher application (SBLauncher.exe), a calibration application (SMARTBoardCalibrate.exe) and an autorun.inf file that references the launcher application. Further, the storage 76 can store calibration settings associated with the configuration of the system 20. In particular, the calibration settings include data for mapping pointer input received by the touch panel 28 with image output projected by the LCD projector 44 onto the surface of the touch panel 28. The position of the LCD projector 44 and the touch panel 28 are generally fixed relative to one another. As a result, once their relative positions are determined through the calibration process that is performed in order to generate the calibration settings, the relative positions of the LCD projector 44 and touch panel 28 and hence, the calibration settings do not have to be re-determined.

[0024] The SMARTBoardTools.exe application permits a richer set of features than basic mouse functionality. It contains a number of presentation applications, integration into popular drawing and presentation applications, and an application to allow users to ink over documents in any application or over the desktop of the graphical user interface of the computer 40 that is projected onto and displayed on the surface of the touch panel 28.

[0025] The method of operation of the plug-and-play device 24 is shown in Figure 3. When the plug-and-play device 24 is connected to the computer 40 (step 104), and the connection of the plug-and-play device 24 to the computer 40 is detected by the operating system of the computer 40, the computer 40 queries the plug-and-play device 24 to determine what functionality is provided by the plug-and-play device 24 (step 108). As the USB hub 72 is connected to storage 76 as well as to the controller 32, the USB hub 72 queries each of these two units to determine what profiles are available. In this embodiment, the storage 76 responds by indicating that it supports the CD HID profile. The controller 32, which is in the initial mode, responds by indicating that it supports the absolute mouse HID profile and the SMARTBoard HID profile.

[0026] The computer 40, upon receiving this profile information, detects that the following functionality is available for the plug-and-play device 24: the absolute mouse HID profile, the SMARTBoard HID profile and CD HID profile (step 112). The computer 40 in turn loads the drivers for the device functionality recognized by the operating system (i.e. for which the operating system has drivers); namely, the absolute mouse HID and CD HID (step 116). As each of these sets of functionality are detected by the computer 40, the computer 40 recognizes them as separate devices. The computer 40 in this embodiment, does not load the SMARTBoard HID profile, as the operating system of the computer 40 does not possess a corresponding driver. The computer 40 then assigns the detected CD HID device the next available drive letter (step 120).

[0027] Computer 40 is configured as the majority of computers are by default; that is, it is configured to search CD HID devices for a file named autorun.inf that will direct the computer 40 to automatically execute a specific application upon connection to a CD HID device. Accordingly, computer 40 queries the CD HID device for autorun.inf and, upon receiving it, loads and executes the instructions contained therein (step 124). The autorun.inf file is used by the Microsoft Windows® family of operating systems to execute, under certain conditions, the instructions contained therein upon detection of certain types of storage devices. For example, under certain conditions, the autorun.inf file is executed when a CD-ROM disk, containing the autorun.inf file, is inserted into the bay of a CD-ROM drive. Execution typically begins without delay after the information in the autorun.inf file becomes available to or is recognized by the operating system of the computer.

[0028] The autorun.inf file contains a pointer to the executable launcher application, SBLauncher.exe. Upon parsing the autorun.inf file, the computer 40 uses the pointer to obtain the SBLauncher.exe application from the storage 76, along with a set of corresponding dynamic link libraries ("DLLs"), and executes the SBLauncher.exe application (step 128). The SBLauncher.exe application, in turn, directs the computer 40 to copy two executable files, namely, SMARTBoardTools.exe and SMARTBoardService.exe, along with

some associated DLLs, from the storage 76 to a temporary directory on the computer 40 and execute them (step 132). Upon execution of the SMARTBoardService.exe service, the SBLauncher.exe application terminates execution and the SMARTBoardService.exe service directs the computer 40 to send a command to the controller 32 to switch to the SMARTBoard HID mode (step 136).

[0029] Upon launch, the SMARTBoardTools.exe application queries and obtains from storage 76 of the plug-and-play device 24, the calibration settings and other settings (step 140). The calibration settings enable the SMARTBoardTools.exe application to map touch input received from the touch panel 28 to the computer display coordinate system. The other settings include pen tray settings, COM port settings, contact filter settings and user settings for some of the software applications. All of these settings are stored in a standard Windows INI file. Further, several XML files are used to store layout and menu settings for various applets forming part of the SMARTBoardTools.exe application. These applets provide a floating window of toolbuttons for accessing various functionality, an on-screen keyboard, etc. These layout and menu settings are stored in XML files in the storage 76 of the plug-and-play device 24, and are loaded and saved in the user directory "C:\Documents and Settings\<user name>\Application Data\SMART Technologies Inc.\SMARTBoard Software\" during execution of the SMARTBoardTools.exe application, where <user name> is the login name of the current user.

[0030] Upon obtaining the calibration settings, the SMARTBoardTools.exe application permits user interaction with the touch panel 28 to be registered spatially relative to the images projected on the surface of the touch panel 28 by the LCD projector 44. During execution, some settings are stored in the "HKEY_CURRENT_USER" key of the registry and, in particular, in the "Software\SMART Technologies Inc.\SMARTBoard Software\" subkey. These settings include application window positions, user settings for each application and a list of recently used files. The "HKEY_CURRENT_USER" key is used as there are generally no restrictions on modifications made to this key. In addition, if there are no access

restrictions on the "HKEY_LOCAL_MACHINE" key, spell checker settings are written there.

[0031] Upon termination of the session, the computer 40 can be unplugged from the plug-and-play device 24 and removed. When the plug-and-play device 24 is disconnected, the computer 40 notifies the SBLauncher.exe application (step 144). The SBLauncher.exe application proceeds to terminate execution of and delete the SMARTBoardTools.exe application, the SMARTBoardService.exe service, the various related DLLs and settings from the temporary locations on the computer 40 and then proceeds to terminate execution of itself (step 148). Before termination of execution of the SBLauncher.exe application, the SBLauncher.exe application writes the user settings stored in "C\Documents and Settings\<user name>\Application Data\SMART Technologies Inc.\SMARTBoard Software\" to XML files which it then stores in storage 76 of the plug-and-play device 24. The SBLauncher.exe application then deletes these settings and those stored in the registry. Once the settings are deleted from the computer 40, the SBLauncher.exe application places an entry in the HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\RunOnce registry key which tells Windows to delete the SBLauncher.exe application when the user logs in next, and then terminates its execution.

[0032] If the user stops the SMARTBoard software by closing the SMARTBoardTools.exe application, then the SBLauncher.exe application executes the instance of itself found in the storage 76 of the plug-and-play device 24 resulting in the instance of the SBLauncher.exe application stored on the computer 40 being deleted.

[0033] As noted above, in order for touch input made relative to an image projected onto the touch panel 28 by the LCD projector 44 to be registered spatially with the projected image, the system 20 must be calibrated. As the spatial relation between the image projected by the LCD projector 44 and the touch panel 28 changes only when the LCD projector 44 and the touch panel 28 are moved relative to one another, calibration is generally performed after the touch panel 28 and LCD projector 44 are fixed at a location. In order

to calibrate the system 20, the SMARTBoardCalibrate.exe application is launched. Once launched, the user is prompted to touch a number of points on the graphical user interface of the computer 40 that is displayed on the surface of the touch panel 28. The resulting touch panel output is used to map the raw touch coordinates registered by the touch panel 28 to the computer display coordinate system. The newly-captured calibration settings are then recorded in the Windows INI file so that they can be used by other computers to map input received from the plug-and-play device 24 with the graphical user interface presented thereon.

[0034] While the system 20 has been described with specificity to USB, other types of plug-and-play architectures can be utilized. For example, those of skill in the art will readily understand how to adapt the system 20 described herein for use with FireWire and PCMCIA architectures and the like.

[0035] The drivers for the plug-and-play device can be stored on a separate CD HID device or the like. Similarly, the calibration settings can be stored on a separate removable storage, such as a USB flash drive, rewritable optical disk, etc. In this manner, existing calibration settings can be made available to other computers that are coupled to the plug-and-play device. Alternatively, the calibration settings can be stored on the touch panel's controller using the two-way communication enabled by the SMARTBoard HID profile.

[0036] In the embodiment described above, the plug-and-play device 24 comprises a cable 36 having a USB hub component 52 connected to the touch panel 28 via a USB cable 60 and connected to the computer 40 via a USB cable 68. Those of skill in the art will appreciate that the USB hub component 52 may comprise one or more wireless communication interfaces to enable communications between the touch panel 28 and the USB hub component 52 and/or between the USB hub component 52 and the computer 40 to be carried out over wireless communication channels thereby obviating the need for the physical cables. The USB hub component 52 may also be integrated into the touch panel 28 so that only one communication channel, either wired or wireless, between the USB hub component 52 and the computer 40 is required.

[0037] Although the system 20 is shown to include an LCD projector 44 to project images onto the surface of the touch panel 28, those of skill in the art will appreciate that other configurations are possible. For example, the touch panel 28 may be of the form disclosed in U.S. Patent No. 6,803,906 to Morrison et al. or U.S. Patent Application No. 11/331,448 to Morrison et al. In this case, the touch panel 28 overlies a display unit such as a plasma display or LCD display that receives display input from the computer 40.

[0038] While the system has been described with reference to a touch panel, the system can be any one of a number of other devices, such as cameras, sound systems, etc. For example, where the plug-and-play device is a sound system, the settings can include the output volumes for each speaker that have been previously calibrated to desired levels for the set configuration.

[0039] Although an embodiment has been described with reference to the accompanying drawings, those of skill in the art will appreciate that modifications and variations may be made without departing from the spirit and scope thereof as defined by the appended claims.

What is claimed is:

1. A plug-and-play device providing a set of functionality, comprising:
a plug-and-play interface;
storage; and
software stored in said storage, said software being automatically executed by a computer when said plug-and-play device is connected thereto via said plug-and-play interface, said software being operable to detect disconnection of said plug-and-play device from said computer and terminate its execution in response thereto, said computer not persistently storing said software thereafter.

2. The plug-and-play device of claim 1, wherein said software enables said computer to access the set of functionality provided by said plug-and-play device.

3. The plug-and-play device of claim 1, wherein said plug-and-play interface is a universal serial bus interface.

4. The plug-and-play device of claim 3, wherein said storage stores an autorun.inf file that specifies said software for execution.

5. The plug-and-play device of claim 4, wherein said storage is configured to operate in accordance with a CD HID profile.

6. The plug-and-play device of claim 3, wherein upon connection of said plug-and-play device to said computer, said software is copied to a temporary location on said computer and executed therefrom, and is terminated and deleted upon disconnection of the plug-and-play device from the computer.

7. The plug-and-play device of claim 6, wherein said software registers a request with the operating system of said computer to delete said software at a later time.

8. The plug-and-play device of claim 1, wherein upon connection of said plug-and-play device to said computer, said software is copied to a temporary location on said computer and executed therefrom, and is terminated and deleted upon disconnection of the plug-and-play device from the computer.

9. The plug-and-play device of claim 8, wherein said software registers a request with the operating system of said computer to delete said software at a later time.

10. A method of using a plug-and-play device with a computer, comprising:

detecting connection of the plug-and-play device to said computer;

automatically locating software stored in memory of said plug-and-play device specified for execution;

executing said software with said computer; and

terminating execution of said software upon disconnection of said plug-and-play device from said computer.

11. The method of claim 10, further comprising, prior to said executing, copying said software to temporary storage on said computer.

12. The method of claim 11, further comprising registering a request with the operating system of said computer to delete said software at a later time.

13. A plug-and-play device, comprising:

storage; and

settings stored in said storage, said settings being associated with a set of functionality.

14. The plug-and-play device of claim 13, wherein said settings are calibration settings.

15. The plug-and-play device of claim 13, wherein said settings are user settings.

16. The plug-and-play device of claim 13, further comprising:

software stored in said storage, said software providing access to said set of functionality when said plug-and-play device is connected to a computer.

17. The plug-and-play device of claim 14, wherein said set of functionality is an input interface provided by said plug-and-play device.

18. The plug-and-play device of claim 17, further comprising:

software stored in said storage, said software being executable on a computer to which said plug-and-play device is connected to provide access to said set of functionality.

19. The plug-and-play device of claim 18, wherein said software references said calibration settings during execution.

20. The plug-and-play device of claim 19, wherein said software is automatically executed by said computer when said plug-and-play device is connected thereto via a plug-and-play interface thereof, said software detecting disconnection of said plug-and-play device from said computer and

terminating execution in response thereto, said computer not persistently storing said software thereafter.

21. The plug-and-play device of claim 14, further comprising:
calibration software for determining said calibration settings.

22. The plug-and-play device of claim 14, further comprising a touch panel on which images are presented, said calibration settings mapping touch panel and presented image coordinate systems.

23. A plug-and-play device for receiving input, comprising:
a plug-and-play interface;
a touch panel on which a computer-generated image is displayed;
storage; and
calibration settings stored in said storage and mapping touch panel and computer-generated image coordinate systems.

24. The plug-and-play device of claim 23, wherein said computer-generated image is a graphical user interface.

25. The plug-and-play device of claim 24, wherein said plug-and-play interface is a universal serial bus interface.

26. The plug-and-play device of claim 23, further comprising:
calibration software stored in said storage for execution by a computer to determine said calibration settings.

27. A plug-and-play device providing a set of functionality, comprising:
a plug-and-play interface;

storage; and

software stored in said storage, said software being copied to said computer and executed therefrom automatically when said plug-and-play device is connected to said computer, said software providing access to the set of functionality provided by said plug-and-play device.

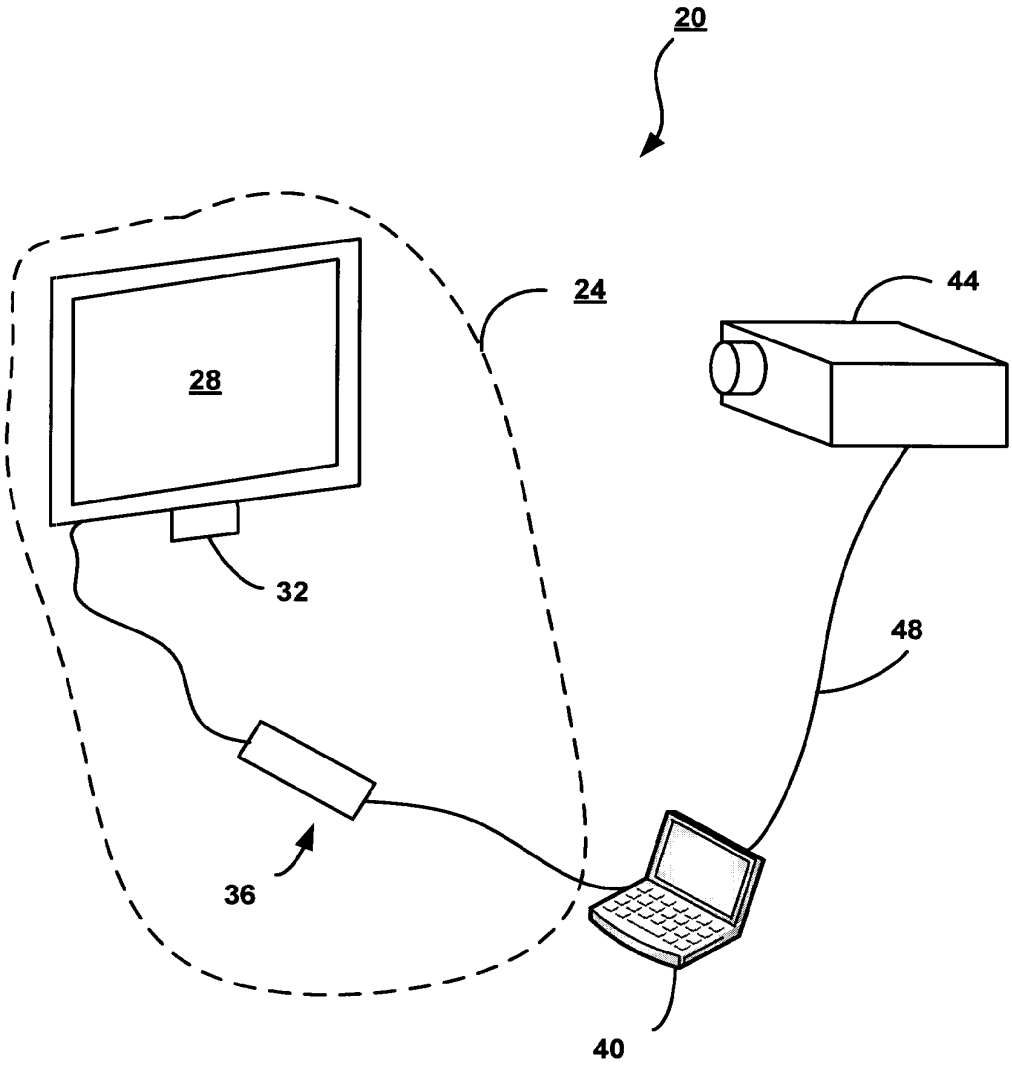


Fig. 1

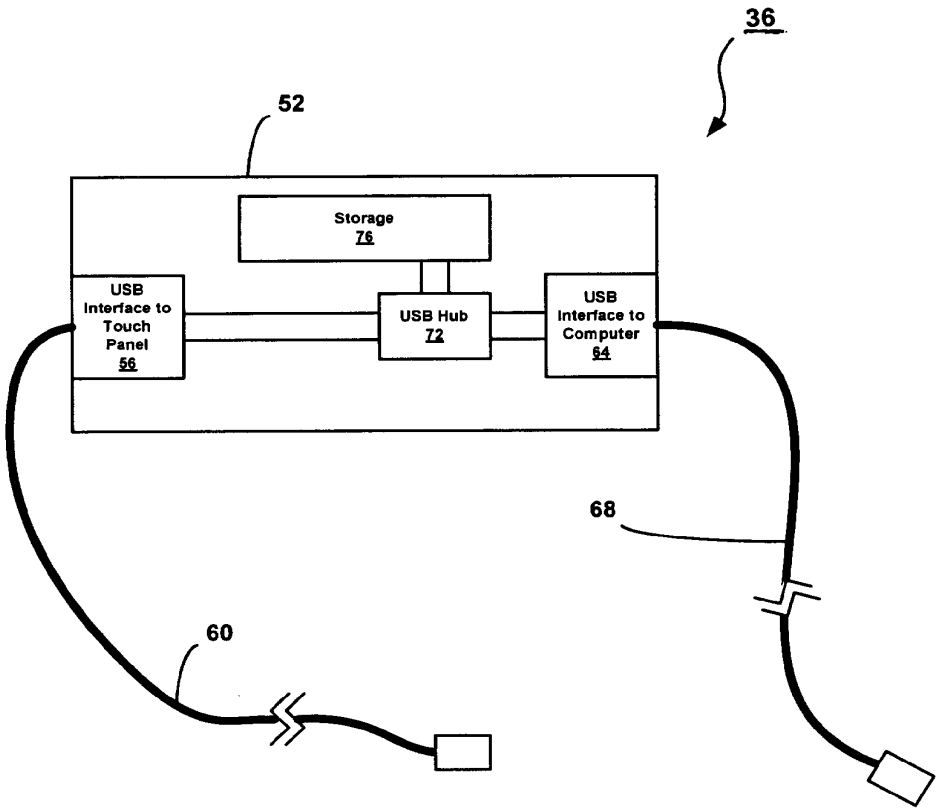

36
52
Storage
76
USB
Interface to
Touch
Panel
56
USB Hub
72
USB
Interface to
Computer
64
68
60

Fig. 2

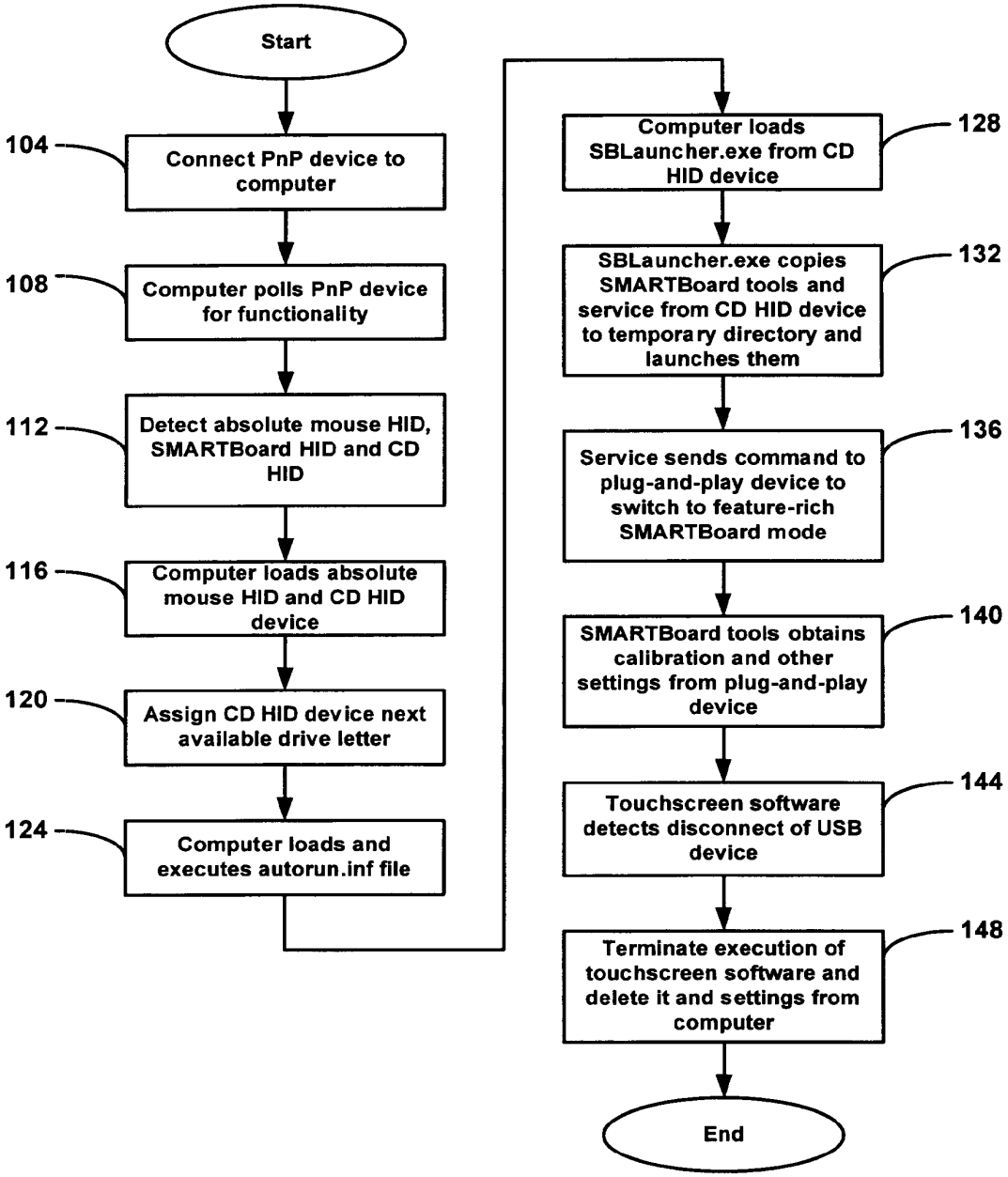

Start
104
Connect PnP device to computer
108
Computer polls PnP device for functionality
112
Detect absolute mouse HID, SMARTBoard HID and CD HID
116
Computer loads absolute mouse HID and CD HID device
120
Assign CD HID device next available drive letter
124
Computer loads and executes autorun.inf file
128
Computer loads SBLauncher.exe from CD HID device
132
SBLauncher.exe copies SMARTBoard tools and service from CD HID device to temporary directory and launches them
136
Service sends command to plug-and-play device to switch to feature-rich SMARTBoard mode
140
SMARTBoard tools obtains calibration and other settings from plug-and-play device
144
Touchscreen software detects disconnect of USB device
148
Terminate execution of touchscreen software and delete it and settings from computer
End

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2007/000938

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***G06F 13/10*** (2006.01) , ***G06F 3/00*** (2006.01) , ***G06F 3/041*** (2006.01) , ***G06F 9/445*** (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F-13/*, G06F-3/*, G06F-9/*

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
WEST, Delphion, Qpat and IEEE(keywords: plug and play, USB, peripheral, driver, store, download, load, install, detect, connect, attach, disconnect, detach, delete, terminate, efficient, touch screen, display, pannel, request, calibrate, user settings, CD-HID and schedule)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0278461 A1 (OHTA (US)) Published 15 Dec. 2005 (15-12-2005) **	13 to 19, 21 and 27
Y	Abstract, Paragraphs [0032] to [0041] and Figure 4 **	1 to 12, 20, 22 to 26
X	US 6,898,653 B2 (SU ET AL. (TW)) Published 24 May 2005 (24-05-2005) **	13 to 19, 21 and 27
Y	Abstract, Column 1, line 52 to Column 4 line 50 and Figure 1 **	1 to 12, 20, 22 to 26

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search	Date of mailing of the international search report
21 June 2007 (21-06-2007)	15 August 2007 (15-08-2007)

Name and mailing address of the ISA/CA	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Niall Zelem 819- 953-9814

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,085,265 (KOU (US)) 4 Jul. 2000 (04-07-2000) ** Abstract, Column 3, lines 49 to 52, Column 11, lines 1 to 17 and Figure 1 **	1 to 12 and 20
Y	US 2002/0118180 A1 (MARTIN (CA)) 29 Aug. 2002 (29-08-2002) ** Paragraph [0041], Paragraph [0043] and Paragraphs [0051] to [0072] **	22 to 26

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2007/000938

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US2005278461	15-12-2005	EP1662385 A2	31-05-2006
		JP2005353073 A	22-12-2005
US6898653	24-05-2005	EP1434128 A1	30-06-2004
US6085265	04-07-2000	NONE	
US2002118180	29-08-2002	CA2058219 A1	22-04-1993
		CA2367864 A1	22-04-1993
		JP6110608 A	22-04-1994
		US5448263 A	05-09-1995
		US6141000 A	31-10-2000
		US6337681 B1	08-01-2002
		US6747636 B2	08-06-2004
		US2004263488 A1	30-12-2004

Electronic Acknowledgement Receipt

EFS ID:	24798391
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Customer Number:	23364
Filer:	Thomas J. Moore/Kaitlyn Miller
Filer Authorized By:	Thomas J. Moore
Attorney Docket Number:	BEEL3004/TJM/TL
Receipt Date:	04-FEB-2016
Filing Date:	03-MAR-2015
Time Stamp:	13:55:51
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	BEEL3004_IDS_SB08.pdf	612119 e9282dbdd4b0596f3cf09e86b5830ef315512efe	no	4

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2	Non Patent Literature	EP_OA_21DEC15.pdf	206825 a1c8ce21cc42699ae5d7946221b2f4b08e23e26e	no	7
Warnings:					
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3	Foreign Reference	WO2007137415A1.pdf	914042 a4a4453b250c2be8046b3390d2c6742449713bb1	no	25
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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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Office of Petitions: Routing Sheet



Application No. 14/344,836

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application, as indicated below. For details of this decision, please see the document PET.OP.DEC filed on the same date as this document.

- [x] **GRANTED**
- [ ] **DISMISSED**
- [ ] **DENIED**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/344,836	03/03/2015	Koen Simon Herman Beel	BEEL3004/TJM/TL	1046

23364 7590 12/31/2015

BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

EXAMINER	
PHAN, DEAN	

ART UNIT	PAPER NUMBER
2184	

NOTIFICATION DATE	DELIVERY MODE
12/31/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

MAIL@BACONTHOMAS.COM

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Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Applicants: Koen Simon Herman Beel et al
Appl. No.: 14/344,836
International Filing Date: September 14, 2012
Title: ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
Attorney Docket: BEEL3004/TJM/TL
Pub. No.: US20150169477A1
Pub. Date: June 18, 2015

This is a decision on the request for a corrected patent application publication under 37 CFR 1.221(b), received on August 14, 2015, for the above-identified application.

The request is granted.

The corrected patent application publication will be published in due course, unless the patent issues before the application is republished.

Inquiries relating to this matter may be directed to Karen Creasy at (571) 272-3208.

/Christopher Bottorff/

Christopher Bottorff
Petitions Examiner
Office of Petitions

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Application No.:	14/344,836	Confirm. No.:	1046
Filing Date:	March 3, 2015	Examiner:	Dean Phan
First Inventor:	Koen Simon Herman BEEL	Art Unit:	2184
Attorney No.:	BEEL3004/TJM/TL	Customer No.:	23364
For:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS		

REQUEST FOR REPUBLICATION UNDER 37 C.F.R. § 1.221(b)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INTRODUCTORY COMMENTS

This request is made to correct errors in the publication of the above-identified application, which was published as U.S. patent application publication no. 2015/0169477 A1 on June 18, 2015.

This request for republication of the application under 37 C.F.R. § 1.221(b) is filed because the Office made a material mistake which is apparent from the Office records. This request is timely submitted within 2 months of the date of the publication of the application.

As indicated in MPEP 1130(A)(D), for applications filed on or after September 16, 2012, when the publication does not include the proper benefit claim, a material mistake has been made. In this case, as evidenced in the Application Data Sheet filed March 13, 2014, the present application is the national stage entry of PCT/EP2012/068167, and claims the benefit of provisional application 61/534,592 filed September 14, 2011, provisional application 61/635,234, filed April 18, 2012, and is a continuation-in-part of U.S. application 13/270,659, filed October 11, 2011.

However, as shown on the cover sheet of U.S. publication 2015/0169477 at INID code (60), the Office has mistakenly duplicated the benefit claim to Provisional Application no. 61/534,592 instead of including Provisional application 61/635,234, filed April 18, 2012. Additionally, the Office has mistakenly identified at INID code (63) that the pending application is a continuation of application no. 13/270,659, instead of a continuation-in-part application of application no. 13/270,659.

In view of the improper benefit claims listed on the publication, Applicants submit that the Office has made a material mistake in the publication of the application.

Moreover, Applicants submit that a material mistake was made in the publication of claim 95. Specifically, Applicants request correction of claim 95 which has mistakenly included the term "means fir" instead of "means for," which could lead to an improper understanding of the claimed features. The correct term "means for" is shown on page 7 of the Preliminary Amendment filed March 13, 2015.

A sequential listing of the mistakes is appended hereto and identifies: i) the location of the correct originally filed text; ii) the location of the mistakes in the published text; and iii) the correction requested.

Favorable consideration of this requests is requested. No fee is required for this correction and republication, since the mistake was made by the Office.

BACON & THOMAS, PLLC
625 Slaters Lane, Fourth Floor
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Date: August 14, 2015

Respectfully submitted,

/Thomas J. Moore/

THOMAS J. MOORE
Attorney for Applicants
Registration No. 28,974

Attorney Docket: BEEL3004/TJM/TL
Patent Application No.: 14/344,836
Filed: March 3, 2015
Publication No. 2015/0169477 A1
Publication Date: June 18, 2015

List of Errors and Requested Corrections
in Patent Application Publication

No.	Text As Filed Location	Publication Location	Correction Required
1.	Application Data Sheet filed March 13, 2014 at page 4 under the Heading Domestic Benefit/National Stage Information	Cover Sheet: At INID code (60).	Change: Provisional application No. 61/534,592, filed on Sep. 14, 2011, provisional application No. 61/534,592, filed on Sep. 14, 2011. To: Provisional application No. 61/534,592, filed on Sep. 14, 2011, provisional application No. 61/635,234, filed on Apr. 18, 2012.
2.	Application Data Sheet filed March 13, 2014 at page 4 under the Heading Domestic Benefit/National Stage Information	Cover Sheet: At INID code (63).	Change: Continuation of application No. 13/270,659, filed on Oct. 11, 2011, now Pat. No. 8,756,348. To: Continuation-in-part of application No. 13/270,659, filed on Oct. 11, 2011, now Pat. No. 8,756,348.
3.	Preliminary Amendment filed March 13, 2014 at page 7.	Page 18 at claim 95.	Change: The system of claim 92 further comprising means fir presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently. To: The system of claim 92 further comprising means for presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

US 20150169477A1

(19) **United States**

(12) **Patent Application Publication**

Beel et al.

(10) **Pub. No.: US 2015/0169477 A1**

(43) **Pub. Date: Jun. 18, 2015**

(54) **ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS**

(75) Inventors: **Koen Simon Herman Beel**, Eke (BE); **Yoav Nir**, Komen (BE); **Filip Josephine Johan Louwet**, Knesselare (BE); **Guy Coen**, Aalst (BE)

(73) Assignee: **BARCO N.V.**, Kortrijk (BE)

(21) Appl. No.: **14/344,836**

(22) PCT Filed: **Sep. 14, 2012**

(86) PCT No.: **PCT/EP2012/068167**

§ 371 (c)(1),
(2), (4) Date: **Mar. 3, 2015**

Related U.S. Application Data

(63) Continuation-in-part ~~Continuation~~ of application No. 13/270,659, filed on Oct. 11, 2011, now Pat. No. 8,756,348.

(60) Provisional application No. 61/534,592, filed on Sep. 14, 2011, provisional application No. ~~61/534,592,~~ 61/635,234 filed on ~~Sep. 14, 2011.~~ Apr. 18, 2012.

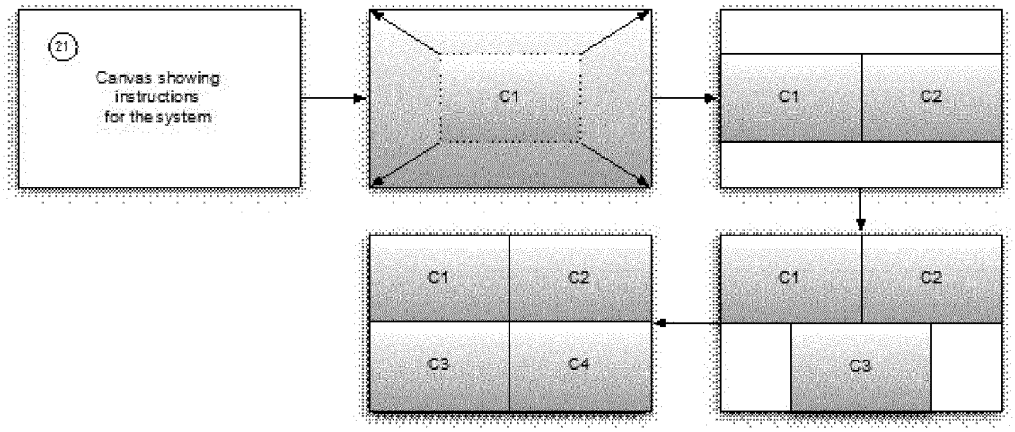
Publication Classification

(51) **Int. Cl.**
G06F 13/10 (2006.01)
G06F 9/445 (2006.01)

(52) **U.S. Cl.**
CPC ***G06F 13/102*** (2013.01); ***G06F 9/44505*** (2013.01)

(57) **ABSTRACT**

An electronic meeting tool and method for communicating arbitrary media content from users at a meeting comprises a node configuration means adapted to operate a display node of a communications network, the display node being coupled to a first display. The node configuration means is adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display. A peripheral device adapted to communicate the user selected arbitrary media content via the communications network is a connection unit comprising a connector adapted to couple to a port of a processing device having a second display, a memory and an operating system, and a transmitter. A program is adapted to obtain user selected arbitrary media content, said program leaving a zero footprint on termination. The user may trigger transfer of said user selected arbitrary media content to said transmitter.



[0324] In the above embodiments, a particular method of pairing the peripheral device with the base node has been described. Any of the embodiments of the present invention may include other pairing mechanisms of which some examples are given below.

[0325] Some examples for pairing

[0326] Plug in the peripheral device, to a generic peripheral device port such as a USB port of the base node or other USB enabled device. Pairing info is transmitted over the generic peripheral interface such as USB.

[0327] The Signal strength of the wireless channel to the base node is used to identify which base nod is to be used

[0328] The Signal strength of the wireless channel or any other channel. Example is an NFC/RFID transmitter can be provided underneath the meeting room table. Putting the user processing device such as a laptop and the peripheral device plugged in on this table automatically pairs the peripheral device with the base of this meeting room

[0329] Manual pairing (e.g. by entering IP address, hostname, wireless ID (like SSID on WiFi))

1-81. (canceled)

82. A method for connecting a processing device to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the method comprising:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;

c) coupling the processing device to a communications network via the peripheral device;

d) routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

83. The method of claim **82** wherein Step b) comprises presenting the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

84. The method of claim **82** wherein Step b) comprises presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

85. The method of claim **82** wherein Step b) comprises presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

86. The method of claim **82**, wherein a client application is stored on the peripheral device which when run on the processing device obtains screen scraped data.

87. The method of claim **86** wherein the client application is a portable application.

88. The method of claim **82** wherein the peripheral device is adapted to anal se an incoming signal from the processing device and if no audio is received, the incoming signal is discarded.

89. The method of claim **88** wherein if audio is received, the peripheral device will initiate an additional connection to the base unit through the communications network.

90. The method of claim **82** further comprising time-stamping synchronously the audio with the data stream.

91. The method of claim **90** further comprising encoding, optionally encrypting the audio data.

92. A system for connecting a processing device to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the system comprising:

a) means for coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) means for setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;

c) means for coupling the processing device to a communications network via the peripheral device;

d) means for routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

93. The system of claim **92** further comprising means for presenting the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

94. The system of claim **92** further comprising means for presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

95. The system of claim **92** further comprising ~~means for~~ means for presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

96. The system of claim **92** wherein a client application is stored on the peripheral device which when run on the processing device obtains screen scraped data.

97. The system of claim **96** wherein the client application is a portable application.

98. The system of claim **92** wherein the peripheral device is adapted to analyse an incoming signal from the processing device and if no audio is received, the incoming signal is discarded.

99. The system of claim **98** wherein if audio is received, the peripheral device will initiate an additional connection to the base unit through the communications network.

100. The system of claim **92** further comprising time-stamping synchronously the audio stream with the data stream.

101. The system of claim **100** further comprising means for encoding, optionally encrypting the audio data.

Electronic Acknowledgement Receipt

EFS ID:	23214671
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Customer Number:	23364
Filer:	Thomas J. Moore/Kaitlyn Miller
Filer Authorized By:	Thomas J. Moore
Attorney Docket Number:	BEEL3004/TJM/TL
Receipt Date:	14-AUG-2015
Filing Date:	03-MAR-2015
Time Stamp:	15:48:02
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request/Corrected Patent Application Publications	BEEL3004_repub_reqst_13AUG15.pdf	72921 283257eae353029b3c3a22f75b822749a6990c40	no	3
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2	Request/Corrected Patent Application Publications	BEEL3004_marked_up_pub_13 AUG15.pdf	1082989 f3371f8931668ddc2f256ff271395c280cdc2dce	no	2

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National Stage of an International Application under 35 U.S.C. 371
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If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14344836
Filing Date	2015-03-03
First Named Inventor	Koen Simon Herman BEEL
Art Unit	2184
Examiner Name	Dean Phan
Attorney Docket Number	BEEL3004/TJM/TL

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	Dean Phan
	Attorney Docket Number	BEEL3004/TJM/TL

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	European Office Communication dated June 15, 2015, for EP 12762258.7.	☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	Dean Phan
	Attorney Docket Number	BEEL3004/TJM/TL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas J. Moore/	Date (YYYY-MM-DD)	2015-07-21
Name/Print	THOMAS J. MOORE	Registration Number	28974

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	22975440
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Customer Number:	23364
Filer:	Thomas J. Moore/Kaitlyn Miller
Filer Authorized By:	Thomas J. Moore
Attorney Docket Number:	BEEL3004/TJM/TL
Receipt Date:	21-JUL-2015
Filing Date:	03-MAR-2015
Time Stamp:	16:05:21
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	BEEL3004_IDS_SB08.pdf	612033 14c56343d303ee90230c982bfb0864c48f4465d8	no	4
Warnings:					
Information:					

A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.

2	Non Patent Literature	EP_OA_15JUN15.pdf	155793 e44a3a43fa8017a32c89d97cd176d9652ad8c2ea	no	5

Warnings:

Information:

Total Files Size (in bytes):	767826

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/344,836	03/03/2015	Koen Simon Herman Beel	BEEL3004/TJM/TL

CONFIRMATION NO. 1046

23364
BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

PUBLICATION NOTICE

OC000000075811646

Title:ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

Publication No.US-2015-0169477-A1
Publication Date:06/18/2015

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
14/344,836	Koen Simon Herman Beel	BEEL3004/TJM/TL

23364
BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

INTERNATIONAL APPLICATION NO.	
PCT/EP2012/068167	
I.A. FILING DATE	PRIORITY DATE
09/14/2012	09/14/2011

CONFIRMATION NO. 1046
371 ACCEPTANCE LETTER

OC00000007381218

Date Mailed: 03/13/2015

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office, in its capacity as a Designated / Elected Office (37 CFR 1.495), has ACCEPTED the above identified international application for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

03/03/2015	03/03/2015
DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS	DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).*

The following items have been received:

- Copy of the International Application filed on 03/13/2014
- Copy of the International Search Report filed on 03/13/2014
- Copy of IPE Report filed on 03/13/2014
- Preliminary Amendments filed on 03/13/2014
- Information Disclosure Statements filed on 03/13/2014
- Inventor's Oath or Declaration filed on 03/03/2015
- Request for Immediate Examination filed on 03/13/2014
- U.S. Basic National Fees filed on 03/13/2014
- Priority Documents filed on 03/13/2014
- Power of Attorney filed on 02/24/2015
- Authorization to Permit Access filed on 03/03/2015
- Application Data Sheet (37 CFR 1.76) filed on 03/13/2014

FORM PCT/DO/EO/903 (371 Acceptance Notice)

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

CHARITTA A SHELTON

Telephone: (571) 272-3926

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/344,836	03/03/2015		1700	BEEL3004/TJM/TL	21	3

CONFIRMATION NO. 1046

23364
BACON & THOMAS, PLLC
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ALEXANDRIA, VA 22314-1176

FILING RECEIPT

OC000000073881217

Date Mailed: 03/13/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Koen Simon Herman Beel, Eke, BELGIUM;
Yoav Nir, Komen, BELGIUM;
Filip Josephine Johan Louwet, Knesselare, BELGIUM;
Guy Coen, Aalst, BELGIUM;

Applicant(s)

Koen Simon Herman Beel, Eke, BELGIUM;
Yoav Nir, Komen, BELGIUM;
Filip Josephine Johan Louwet, Knesselare, BELGIUM;
Guy Coen, Aalst, BELGIUM;

Assignment For Published Patent Application

BARCO N.V., Kortrijk, BELGIUM

Power of Attorney: The patent practitioners associated with Customer Number 23364

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/EP2012/068167 09/14/2012
which claims benefit of 61/534,592 09/14/2011
and is a CON of 13/270,659 10/11/2011 PAT 8756348
which claims benefit of 61/534,592 09/14/2011

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 03/10/2015
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/344,836**
Projected Publication Date: 06/18/2015
Non-Publication Request: No
Early Publication Request: No
Title

ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/344,836

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	480
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	21 minus 20 =	* 1			OR	x 80 =	80
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1560

APPLICATION AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
In re Application of:

Application No.:	14/344,836	**Examiner:**	Unassigned
Filing Date:	March 13, 2014	**Art Unit:**	Unassigned
First Inventor:	Koen Simon Herman BEEL	**Customer No.:**	23364
Attorney No.:	BEEL3004/TJM/TL	**Confirm. No.:**	1046
For:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS		

RESPONSE TO NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

INTRODUCTORY COMMENTS

This is responsive to the Notification of Missing Requirements mailed in this application on August 7, 2014, wherein the Office requires that a declaration be submitted. This Response is submitted with a Pre-AIA Declaration executed by the inventors and a Supplemental Application Data Sheet to reflect the change in address of the inventor, Yoav NIR.

A petition and appropriate fee to extend the period of reply by five months is concurrently filed herewith.

REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars.

Specifically, the declaration is hereby submitted herewith.

If any issues remain that may be resolved by a telephone or facsimile communication with the Applicant's attorney, the Examiner is invited to contact the undersigned at the numbers shown.

BACON & THOMAS, PLLC
625 Slaters Lane, Fourth Floor
Alexandria, Virginia 22314-1176
Phone: (703) 683-0500

Respectfully submitted,

/Thomas J. Moore/

Date: March 3, 2015

THOMAS J. MOORE
Attorney for Applicants
Registration No. 28,974

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Application No.:	14/344,836	**Confirm. No.:**	1046
Filing Date:	March 13, 2014	**Art Unit:**	TBD
First Inventor:	Koen Simon Herman BEEL	**Customer No.:**	23364
Attorney No.:	BEEL3004/TJM/TL	**Examiner:**	TBD
For:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS		

CORRECTION OR UPDATE OF APPLICATION DATA SHEET
(Supplemental ADS)

Commissioner for Patents

Sir:

Applicant submits below an update to the last Application Data Sheet (ADS) submitted in the subject application on March 13, 2014. This updates the address of second inventor Yoav NIR.

Please charge any additional fees required or credit any overpayments in connection with this paper to Deposit Account No. 02-0200.

Section Heading (include main heading and subheading(s) as appropriate)	**Correction or Update** (interlineate, bracket or underline changes)
Inventor Information, Inventor 2, Residence Information, City	~~Rekkem~~ Komen
Inventor Information, Inventor 2, Mailing Address of Inventor, Address 1	~~Lentedreef 21~~ rue de Ten Brielen 19
Inventor Information, Inventor 2, Mailing Address of Inventor, City	~~Rekkem~~ Komen
Inventor Information, Inventor 2, Mailing Address of Inventor, Postal Code	~~B-8930~~ B-7780

Please charge any additional fees required or credit any overpayments in connection with this paper to Deposit Account No. 02-0200.

BACON & THOMAS, PLLC
625 Slaters Lane, Fourth Floor
Alexandria, Virginia 22314-1176
Phone: (703) 683-0500
Facsimile: (703) 683-1080

Date: March 3, 2015

Respectfully submitted,

/Thomas J. Moore/

THOMAS J. MOORE
Attorney for Applicants
Registration No. 28,974

Electronic Patent Application Fee Transmittal

Application Number:	14344836
Filing Date:	
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman BEEL
Filer:	Thomas J. Moore/Kaitlyn Miller
Attorney Docket Number:	BEEL3004/TJM/TL

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 5 months with $0 paid	1255	1	3000	3000
Miscellaneous:				
		Total in USD ($)		**3000**

Electronic Acknowledgement Receipt	
EFS ID:	21651127
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman BEEL
Customer Number:	23364
Filer:	Thomas J. Moore/Kaitlyn Miller
Filer Authorized By:	Thomas J. Moore
Attorney Docket Number:	BEEL3004/TJM/TL
Receipt Date:	03-MAR-2015
Filing Date:	
Time Stamp:	15:36:39
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$3000
RAM confirmation Number	2285
Deposit Account	020200
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	BEEL3004_EOT_Form.pdf	156602 375c4049dfb0d5ebc23d248c205daaaae7ecd295	no	2
Warnings:					
Information:					
2	Oath or Declaration filed	BEEL3004_PreAIA_Dec.pdf	448871 0e9853ec4601739b54cce13ac4e9af4e1e2c489d	no	2
Warnings:					
Information:					
3	Applicant Response to Pre-Exam Formalities Notice	BEEL3004_Rsp_MissReq_Dec_03MAR15.pdf	118827 8726fc5bf56882ee3183235695374de74a67484d	no	2
Warnings:					
Information:					
4	Application Data Sheet	BEEL3004_Supp_ADS_InvAddrs.pdf	105679 825ded37333c86491aba0b5ef0676719f304ea61	no	2
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
5	Fee Worksheet (SB06)	fee-info.pdf	30608 ae94b7d5ec6ed6e8392549bfa93f944f5848bd2e	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	860587		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/22 (03-13)
Approved for use through 3/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional) BEEL3004/TJM/TL
Application Number 14/344,836	Filed March 13, 2014
For ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS	
Art Unit	Examiner

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☐	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☑	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$ 3000

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☑ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 02-0200.

☑ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 28,974.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Thomas J. Moore/ — Signature

March 3, 2015 — Date

THOMAS J. MOORE — Typed or printed name

703-683-0500 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ATTORNEY/DOCKET NO: BEEL3004/TJM/TL

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name; I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention (Design, if applicable) entitled:

ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

the specification of which (check one):
☐ is attached hereto, or ☑ was filed on: March 13, 2014 as U.S. Application Number or PCT International Application Number: 14/344,836 and (if applicable) was amended on: _____.
I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in *Title 37, Code of Federal Regulations, '1.56*. I hereby claim foreign priority benefits under *Title 35, United States Code '119* of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)			PRIORITY CLAIMED	
Number	**Country**	**Day/Month/Year Filed**	**Yes**	**No**

☐ Additional Priority Application(s) Listed on Following Page(s)

I HEREBY CLAIM THE BENEFIT UNDER TITLE 35 U.S. CODE '119(E) OF ANY U.S. PROVISIONAL APPLICATIONS LISTED BELOW.	
Application Number	**Day/Month/Year Filed**
61/534,592	14/09/2011
61/635,234	18/04/2012

☐ Additional Provisional Application(s) Listed on Following Page(s)

I hereby claim the benefit under *Title 35, United States Code, '120* of any United States application(s) or PCT international application(s) designating The United States of America listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of *Title 35, United States Code, '112*, I acknowledge the duty to disclose information which is material to patentability as defined in *Title 37, Code of Federal Regulations, '1.56* which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

Application Number	Filing Date	Status - Patented, Pending or Abandoned
13/270,659	October 11, 2011	Pending

☐ Additional US/PCT Priority Application(s) listed on Following Page(s)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under *section 1001 of title 18 of the United States Code* and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Send correspondence to: **BACON & THOMAS, PLLC**
Customer Number: 23364
625 Slaters Lane, 4th Floor
Alexandria, VA 22314-1176

Telephone Calls to: **Bacon & Thomas, PLLC**
(703) 683-0500

FULL NAME OF FIRST OR SOLE INVENTOR	CITIZENSHIP
Koen Simon Herman BEEL	Belgium
RESIDENCE ADDRESS Zandstraat 20a, Eke B-9810, Belgium	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW
DATE 30/07/2015	SIGNATURE

☑ See following page(s) for additional joint inventors.

ATTORNEY/DOCKET NO: BEEL3004/TJM/TL

CONTINUATION OF DECLARATION FOR PATENT APPLICATION

FULL NAME OF JOINT INVENTOR	CITIZENSHIP
Yoav NIR	Belgium
RESIDENCE ADDRESS ~~Lentedreef 21, Rekkem, B-8930, Belgium~~ rue de Ten Brielen 19 7780 KOMEN BELGIUM	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW rue de Ten Brielen 15, 7780 KOMEN BELGIUM
DATE 23/02/2015	SIGNATURE

FULL NAME OF JOINT INVENTOR	CITIZENSHIP
Filip Josephine Johan LOUWET	Belgium
RESIDENCE ADDRESS De Wijngaard 1, Knesselare B-9910, Belgium	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW
DATE 30/11/15	SIGNATURE

FULL NAME OF JOINT INVENTOR	CITIZENSHIP
Guy COEN	Belgium
RESIDENCE ADDRESS Louis Camustraat 25, Aalst B-9300, Belgium	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW
DATE 30/11/15	SIGNATURE

FULL NAME OF JOINT INVENTOR	CITIZENSHIP
RESIDENCE ADDRESS	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW
DATE	SIGNATURE

☐ See following pages for additional joint inventors/priority applications.

Attorney Docket: BEEL3004/TJM/TL
Page 1 of 1

POWER OF ATTORNEY BY APPLICANTS

TITLE OF INVENTION: ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

This power revokes any previous powers of attorney given in:

☒ United States application number 14/344,836 filed on March 13, 2014.

I (we) hereby appoint Practioners associated with the following Customer Number as my/our attorney, and to transact all business in the United States Patent and Trademark Office connected therewith for the application identified above:

Customer Number: 23364

Please recognize or change the correspondence address for the above-identified application to the address associated with the above-mentioned Customer Number.

I (we) am/are the Applicant as:

☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign. This revocation and appointment to the above-identified Practitioners is to the exclusion of the inventor(s).

Non-Inventor Applicant

Non-Inventor Entity Name	BARCO N.V.		
Signature	X	Date	X October 6, 2014
Name and Title	X Filip Pinkelan, Barco Sr. VP - COO		

☐ Additional Inventor(s) Applicants(s) is/are being named on the supplemental sheet(s) attached hereto.

Power by Applicant rev. 04JAN13
Bacon & Thomas, PLLC

Electronic Acknowledgement Receipt

EFS ID:	21582319
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman BEEL
Customer Number:	23364
Filer:	Thomas J. Moore/Kaitlyn Miller
Filer Authorized By:	Thomas J. Moore
Attorney Docket Number:	BEEL3004/TJM/TL
Receipt Date:	24-FEB-2015
Filing Date:	
Time Stamp:	13:33:54
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	BEEL3004_POA.pdf	61970 df61b681856cb5df7f78cd5a656d0adc9796b4ca	no	1

Warnings:

Information:

Total Files Size (in bytes):	61970

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14344836
Filing Date	2014-03-13
First Named Inventor	Koen Simon Herman BEEL
Art Unit	
Examiner Name	
Attorney Docket Number	BEEL3004/TJM/TL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2014-03-13
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	
	Examiner Name	
	Attorney Docket Number	BEEL3004/TJM/TL

	1	Martin Trautschold, iPhone 4 Made Simple, 2010, Apress, Pages 1-819.	☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2014-03-13
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	
	Examiner Name	
	Attorney Docket Number	BEEL3004/TJM/TL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas J. Moore/	Date (YYYY-MM-DD)	2014-10-31
Name/Print	THOMAS J. MOORE	Registration Number	28,974

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	20576691
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman BEEL
Customer Number:	23364
Filer:	Thomas J. Moore/Kaitlyn Miller
Filer Authorized By:	Thomas J. Moore
Attorney Docket Number:	BEEL3004/TJM/TL
Receipt Date:	31-OCT-2014
Filing Date:	
Time Stamp:	15:39:46
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	BEEL3004_IDS_SB08.pdf	612035 84b48630effedc2fd5deafbbc2927bce35fa102b	no	4

Warnings:	
Information:	

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2	Non Patent Literature	Trautschold_NPL.pdf	18436547 cd94c3390e9eb752359d4b71faf1f37ae834b1cf	no	819

Warnings:

Information:

Total Files Size (in bytes):	19048582

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14344836
Filing Date	2014-03-13
First Named Inventor	Koen Simon Herman BEEL
Art Unit	
Examiner Name	Unassigned
Attorney Docket Number	BEEL3004/TJM/TL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2014-03-13
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	
	Examiner Name	Unassigned
	Attorney Docket Number	BEEL3004/TJM/TL

	1	International Preliminary Report on Patentability (IPRP) dated March 27, 2014, for PCT/EP2012/068166.	☐
	2	International Preliminary Report on Patentability (IPRP) dated March 27, 2014, for PCT/EP2012/068167.	☐
	3	International Preliminary Report on Patentability (IPRP) dated March 27, 2014, for PCT/EP2012/068168.	☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14344836
	Filing Date	2014-03-13
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	
	Examiner Name	Unassigned
	Attorney Docket Number	BEEL3004/TJM/TL

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas J. Moore/	Date (YYYY-MM-DD)	2014-10-09
Name/Print	THOMAS J. MOORE	Registration Number	28974

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	20377670
Application Number:	14344836
International Application Number:	
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman BEEL
Customer Number:	23364
Filer:	Thomas J. Moore/Kaitlyn Miller
Filer Authorized By:	Thomas J. Moore
Attorney Docket Number:	BEEL3004/TJM/TL
Receipt Date:	09-OCT-2014
Filing Date:	
Time Stamp:	16:54:20
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	BAR0210PCT_IPRP.pdf	536789 00e43d44c3f7f6a3ee7f70b59811d5c434dd198b	no	6

Warnings:	
Information:	

2	Non Patent Literature	BAR0443PCT_IPRP.pdf	503427 d6e4e5735694fe76a73bda1ec63eb0c8c5ac6f38	no	6
Warnings:					
Information:					
3	Non Patent Literature	BAR0448PCT_IPRP.pdf	556942 3e88b7f50acbd56f02c84b10705cfd3cf616dde0	no	7
Warnings:					
Information:					
4	Information Disclosure Statement (IDS) Form (SB08)	BEEL3004_IDS_SB08.pdf	612168 acc322d594357bedf9dea848b062f9e7c68432fc	no	4
Warnings:					
Information:					

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Total Files Size (in bytes):	2209326

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New Applications Under 35 U.S.C. 111

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New International Application Filed with the USPTO as a Receiving Office

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UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
14/344,836	Koen Simon Herman BEEL	BEEL3004/TJM/TL

23364
BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

INTERNATIONAL APPLICATION NO.	
PCT/EP2012/068167	
I.A. FILING DATE	PRIORITY DATE
09/14/2012	09/14/2011

CONFIRMATION NO. 1046
371 FORMALITIES LETTER



Date Mailed: 08/07/2014

NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as a Designated Office (37 CFR 1.495).

- Priority Document
- Copy of the International Application filed on 03/13/2014
- Copy of the International Search Report filed on 03/13/2014
- Copy of IPE Report filed on 03/13/2014
- Preliminary Amendments filed on 03/13/2014
- Information Disclosure Statements filed on 03/13/2014
- Request for Immediate Examination filed on 03/13/2014
- U.S. Basic National Fees filed on 03/13/2014
- Priority Documents filed on 03/13/2014
- Application Data Sheet (37 CFR 1.76) filed on 03/13/2014

The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

- Oath or declaration of the inventors, in compliance with 37 CFR 1.497(a) and (b), identifying the application by the International application number and international filing date.

ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE OR BY 32 MONTHS FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

FORM PCT/DO/EO/905 (371 Formalities Notice)

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

CHARITTA A SHELTON

Telephone: (571) 272-3926

FORM PCT/DO/EO/905 (371 Formalities Notice)

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/344,836

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	480
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	21 minus 20 =	* 1			OR	x 80 =	80
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1560

APPLICATION AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET Substitute for Form PTO-1360 (For use with Form PTO/SB/06)	Application Number 14344836	Filing Date
	Applicant(s) Koen Simon Herman BEEL	
	* May be used for additional claims or amendments	

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT	
	Indep	Depend	Indep	Depend	Indep	Depend
1	1		---	---		
2		1	---	---		
3		1	---	---		
4		1	---	---		
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8		(1)	---	---		
9		(1)	---	---		
10		(1)	---	---		
11	1		---	---		
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13		1	---	---		
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	Indep	Depend	Indep	Depend	Indep	Depend
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97				1		
98				1		
99				1		
100				1		

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET Substitute for Form PTO-1360 (For use with Form PTO/SB/06)	Application Number 14344836	Filing Date
	Applicant(s) Koen Simon Herman BEEL	

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT	
	Indep	Depend	Indep	Depend	Indep	Depend
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Total Indep	2		3		0	
Total Depend	79	↵	18	↵	0	↵
Total Claims	81		21		0	

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	Indep	Depend	Indep	Depend	Indep	Depend
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PTO-1390 (05-13)
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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

Attorney Docket No.	
BEEL3004/TJM/TL	
U.S. Application No. (if known, see 37 CFR 1.5)	

International Application No.	International Filing Date	Priority Date Claimed
PCT/EP2012/068167	September 14, 2012	September 14, 2011

Title of Invention
ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

First Named Inventor
Koen Simon Herman BEEL

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. ☑ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). NOTE: The express request under 35 U.S.C. 371(f) will not be effective unless the requirements under 35 U.S.C. 371(c)(1), (2), and (4) for payment of the basic national fee, copy of the International Application and English translation thereof (if required), and the oath or declaration of the inventor(s) have been received.
2. ☑ A copy of the International Application (35 U.S.C. 371(c)(2)) is attached hereto (not required if the International Application was previously communicated by the International Bureau or was filed in the United States Receiving Office (RO/US)).
3. An English language translation of the International Application (35 U.S.C. 371(c)(2))
   a. ☐ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
4. An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4))
   a. ☐ is attached.
   b. ☐ was previously filed in the international phase under PCT Rule 4.17(iv).

Items 5 to 8 below concern amendments made in the international phase.

PCT Article 19 and 34 amendments

5. ☐ Amendments to the claims under PCT Article 19 are attached (not required if communicated by the International Bureau) (35 U.S.C. 371(c)(3)).
6. ☐ English translation of the PCT Article 19 amendment is attached (35 U.S.C. 371(c)(3)).
7. ☐ English translation of annexes (Article 19 and/or 34 amendments only) of the International Preliminary Examination Report is attached (35 U.S.C. 371(c)(5)).

Cancellation of amendments made in the international phase

8a. ☐ Do not enter the amendment made in the international phase under PCT Article 19.

8b. ☐ Do not enter the amendment made in the international phase under PCT Article 34.

NOTE: A proper amendment made in English under Article 19 or 34 will be entered in the U.S. national phase application absent a clear instruction from applicant not to enter the amendment(s).

The following items 9 to 17 concern a document(s) or information included.

9. ☑ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
10. ☑ A preliminary amendment.
11. ☑ An Application Data Sheet under 37 CFR 1.76.
12. ☐ A substitute specification. NOTE: A substitute specification cannot include claims. See 37 CFR 1.125(b).
13. ☐ A power of attorney and/or change of address letter.
14. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.3 and 37 CFR 1.821-1.825.
15. ☐ Assignment papers *(cover sheet and document(s))*. Name of Assignee: _____
16. ☐ _____ 37 CFR 3.73(c) Statement *(when there is an Assignee)*.

This collection of information is required by 37 CFR 1.414 and 1.491-1.492. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

U.S. APPLN. No. (if known – see 37 CFR 1.5)	INTERNATIONAL APPLICATION No.	ATTORNEY DOCKET No.
	PCT/EP2012/068167	BEEL3004/TJM/TL

17. ☐ Other items or information:

The following fees have been submitted.	CALCULATIONS	PTO USE ONLY
18. ☑ Basic national fee (37 CFR 1.492(a)) **$280**	$ 280.00	
19. ☑ Examination fee (37 CFR 1.492(c)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** All other situations **$720**	$ 720.00	
20. ☑ Search fee (37 CFR 1.492(b)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority .....**$120** International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB .....**$480** All other situations **$600**	$ 480.00	
TOTAL OF 18, 19, and 20 =	$ 1480.00	
☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) in an electronic medium or computer program listing in an electronic medium) (37 CFR 1.492(j)). Fee for each additional 50 sheets of paper or fraction thereof **$400**		

Total Sheets	Extra Sheets	Number of each addition 50 or fraction thereof (round **up** to a whole number)	RATE	
- 100 =	/ 50 =		x **$400**	$

Surcharge of **$140.00** for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h)).	$ 140.00	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	21 - 20 =	1	x **$80**	$ 80	
Independent claims	3 - 3 =		x **$420**	$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			**+ $780**	$	
Processing fee of **$140.00** for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i)). **+**				$	
TOTAL OF ABOVE CALCULATIONS =				$	
☐ **Applicant asserts small entity status.** See 37 CFR 1.27. Fees above are reduced by ½.					
☐ **Applicant certifies micro entity status.** See 37 CFR 1.29. Fees above are reduced by ¾. Applicant must attach form PTO/SB/15A or B or equivalent.					
TOTAL NATIONAL FEE =				$ 1700.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property. **+**				$	
TOTAL FEES ENCLOSED =				$ 1700.00	
				Amount to be refunded:	$
				Amount to be charged:	$

a. ☐ A check in the amount of $_____ to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees.

c. ☑ The Director is hereby authorized to charge additional fees which may be required, or credit any overpayment, to Deposit Account No. 02-0200 as follows:

i. ☑ any required fee.

ii. ☑ any required fee except for excess claims fees required under 37 CFR 1.492(d) and (e) and multiple dependent claim fee required under 37 CFR 1.492(f).

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038. The PTO-2038 should only be mailed or faxed to the USPTO. However, when paying the basic national fee, the PTO-2038 may NOT be faxed to the USPTO.

ADVISORY: If filing by EFS-Web, do **NOT** attach the PTO-2038 form as a PDF along with your EFS-Web submission. Please be advised that this is **not** recommended and by doing so your **credit card information may be displayed via PAIR**. To protect your information, it is recommended to pay fees online by using the electronic payment method.

NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the International Application to pending status.

Correspondence Address

☑ The address associated with Customer Number: 23364 **OR** ☐ Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone			
Email					

Signature	/Thomas J. Moore/	Date	March 13, 2014
Name (Print/Type)	THOMAS J. MOORE	Registration No. (Attorney/Agent)	28,974

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEEL3004/TJM/TL
	Application Number	
Title of Invention	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Koen Simon Herman		BEEL	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Eke	Country of Residence i	BE

Mailing Address of Inventor:

Address 1	Zandstraat 20a		
Address 2			
City	Eke	State/Province	
Postal Code	B-9810	Country i	BE

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Yoav		NIR	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Rekkem	Country of Residence i	BE

Mailing Address of Inventor:

Address 1	Lentedreef 21		
Address 2			
City	Rekkem	State/Province	
Postal Code	B-8930	Country i	BE

Inventor 3 Remove

Legal Name

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEEL3004/TJM/TL
	Application Number	
Title of Invention	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS	

Prefix	Given Name	Middle Name	Family Name	Suffix
	Filip Josephine Johan		LOUWET	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Knesselare	Country of Residence i	BE

Mailing Address of Inventor:

Address 1	De Wijngaard 1		
Address 2			
City	Knesselare	State/Province	
Postal Code	B-9910	Country i	BE

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Guy		COEN	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Aalst	Country of Residence i	BE

Mailing Address of Inventor:

Address 1	Louis Camustraat 25		
Address 2			
City	Aalst	State/Province	
Postal Code	B-9300	Country i	BE

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	23364		
Email Address	mail@baconthomas.com	Add Email	Remove Email

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEEL3004/TJM/TL
	Application Number	
Title of Invention	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS	

Application Information:

Title of the Invention	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS		
Attorney Docket Number	BEEL3004/TJM/TL	**Small Entity Status Claimed** ☐	
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	6	**Suggested Figure for Publication (if any)**	

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	23364		

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEEL3004/TJM/TL
	Application Number	
Title of Invention	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Claims benefit of provisional	61/534592	2011-09-14
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation in part of	13/270659	2011-10-11
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Claims benefit of provisional	61/635234	2012-04-18
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	a 371 of international	PCT/EP2012/068167	2012-09-14

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

PTO/AIA/14 (12-13)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEEL3004/TJM/TL
	Application Number	
Title of Invention	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEEL3004/TJM/TL
	Application Number	
Title of Invention	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS	

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	BARCO N.V.		
Mailing Address Information:			
Address 1	Pres. Kennedypark 35		
Address 2			
City	Kortrijk	**State/Province**	
Country [i]	BE	Postal Code	B-8500
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

PTO/AIA/14 (12-13)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	BEEL3004/TJM/TL
	Application Number	
Title of Invention	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS	

Organization Name	BARCO N.V.

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	Pres. Kennedypark 35		
Address 2			
City	Kortrijk	**State/Province**	
Country i	BE	Postal Code	B-8500
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/Thomas J. Moore/			Date (YYYY-MM-DD)	2014-03-13
First Name	THOMAS	Last Name	MOORE	Registration Number	28974

Additional Signature may be generated within this form by selecting the Add button. Add

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

International Patent Application No. PCT/EP2012/068167

PCT/DO/EO/US

International Filing Date: September 14, 2014

Attorney Docket: BEEL3004/TJM/TL

Applicant: Koen Simon Herman BEEL et al.

For: ELECTRONIC TOOL AND METHODS FOR MEETINGS

PRELIMINARY AMENDMENT BEFORE EXAMINATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

INTRODUCTORY COMMENTS

This paper accompanies documents submitted to initiate national stage processing of the above-identified international patent application.

Before calculating the filing fee and before formal examination of the application on the merits, it is desired to amend the application in accordance with the following particulars.

AMENDMENTS

AMENDMENTS TO THE ABSTRACT

The abstract is amended as shown on a following page under the heading "AMENDMENTS TO THE ABSTRACT".

AMENDMENTS TO THE CLAIMS

The claims are amended as shown in the following pages under the heading "LIST OF CURRENT CLAIMS". This listing of claims supersedes all prior listing of claims presented in this application, shows currently proposed amendments and shows the current status of all claims in the application.

The amendments to the claims of this application, which originated in a foreign country, are submitted before examination on the merits and are not intended to have a narrowing effect for the purpose of patentability, but rather are made for one or more of the

following reasons: (i) to remove drawing reference numerals unnecessary under U.S. practice; (ii) to remove or reduce multiple dependent claims to reduce the filing fee; (iii) to revise the original language originating in a foreign country to better conform to customary English usage and style for U.S. patent claiming; (iv) to revise original non-U.S. claim terminology into more appropriate English claim terms having a scope of meaning consistent with the original intended language in preparation for U.S. examination; (v) to remove limitations having an effect in a foreign country which is different and unintended under U.S. practice (i.e., changing "consisting of" to "comprising"); (vi) to remove or amend original claim language that could be regarded as alternative expressions that are acceptable under foreign patent practice but possibly subject to objection under U.S. practice, typically having a broadening or neutral effect in the amended claim; and/or (vii) to improve the clarity or meaning of the original language.

In the case of amendments effectively changing an original claim element expressed as a "means plus function" that could raise a presumption of claim expression under 35 U.S.C. 112, 6th paragraph to a structural expression or to an expression removing the presumption of a "means-plus-function" statement, it is not intended to narrow the claim so amended for purposes of patentability, but rather to place the claim in a form considered to be intended by the applicant from a foreign country where claim limitations described in terms of means-plus-function do not have the same effect as under U.S. practice. Thus, such amendments are intended to establish a full range of equivalents to the claim elements so amended under the U.S. doctrine of equivalents and beyond the range associated with "means-plus-function" expressions according to 35 U.S.C. 112, 6th paragraph, just as if the claim so amended was presented originally in its amended form.

All rights are reserved to the original disclosed and claimed subject matter and any cancellation of claims is made without prejudice or disclaimer.

AMENDMENTS TO THE ABSTRACT

The original Abstract is cancelled in favor of the new Abstract presented on the following page.

ABSTRACT

An electronic meeting tool and method for communicating arbitrary media content from users at a meeting comprises a node configuration means adapted to operate a display node of a communications network, the display node being coupled to a first display. The node configuration means is adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display. A peripheral device adapted to communicate the user selected arbitrary media content via the communications network is a connection unit comprising a connector adapted to couple to a port of a processing device having a second display, a memory and an operating system, and a transmitter. A program is adapted to obtain user selected arbitrary media content, said program leaving a zero footprint on termination. The user may trigger transfer of said user selected arbitrary media content to said transmitter.

LIST OF CURRENT CLAIMS

1-81. (Cancelled)

82. (New) A method for connecting a processing device to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the method comprising:
a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;
b) setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;
c) coupling the processing device to a communications network via the peripheral device;
d) routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

83. (New) The method of claim 82 wherein Step b) comprises presenting the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

84. (New) The method of claim 82 wherein Step b) comprises presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

85. (New) The method of claim 82 wherein Step b) comprises presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

86. (New) The method of claim 82, wherein a client application is stored on the peripheral device which when run on the processing device obtains screen scraped data.

87. (New) The method of claim 86 wherein the client application is a portable application.

88. (New) The method of claim 82 wherein the peripheral device is adapted to anal se an incoming signal from the processing device and if no audio is received, the incoming signal is discarded.

89. (New) The method of claim 88 wherein if audio is received, the peripheral device will initiate an additional connection to the base unit through the communications network.

90. (New) The method of claim 82 further comprising time-stamping synchronously the audio with the data stream.

91. (New) The method of claim 90 further comprising encoding, optionally encrypting the audio data.

92. (New) A system for connecting a processing device to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the system comprising:
a) means for coupling a peripheral device to the processing device, the peripheral device having a transceiver;
b) means for setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;
c) means for coupling the processing device to a communications network via the peripheral device;
d) means for routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio

driver is used for transferring the audio data between the processing device and the peripheral device.

93. (New) The system of claim 92 further comprising means for presenting the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

94. (New) The system of claim 92 further comprising means for presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

95. (New) The system of claim 92 further comprising means for presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

96. (New) The system of claim 92 wherein a client application is stored on the peripheral device which when run on the processing device obtains screen scraped data.

97. (New) The system of claim 96 wherein the client application is a portable application.

98. (New) The system of claim 92 wherein the peripheral device is adapted to analyse an incoming signal from the processing device and if no audio is received, the incoming signal is discarded.

99. (New) The system of claim 98 wherein if audio is received, the peripheral device will initiate an additional connection to the base unit through the communications network.

100. (New) The system of claim 92 further comprising time-stamping synchronously the audio stream with the data stream.

101. (New) The system of claim 100 further comprising means for encoding, optionally encrypting the audio data.

102. (New) A peripheral device for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:
a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for audio communication between the peripheral device and the processing device;
a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver;
a third software code portion for routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

REMARKS

Examination of the application as amended is respectfully requested.

Respectfully submitted,
BACON & THOMAS, PLLC

/Thomas J. Moore/

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Attorney Docket Number	BEEL3004/TJM/TL

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	2	20060095376	A1	2006-05-04	Mitchell et al.	Cited in Specification
	3	20090198839	A1	2009-08-06	Banerjee et al.	Cited in Specification
	4	20110115689	A1	2011-05-19	Sugiyama et al.	Cited in Specification

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	5	20020196378	A1	2002-12-26	Slobodin et al.	Cited in Specification
	6	20130067121	A1	2013-05-14	Beel et al.	Related U.S. App. 13/270,659
	7	20130050254	A1	2013-02-28	Tran et al.	Cited in related U.S. App. 13/270,659
	8	20120331509	A1	2012-12-27	Laksono	Cited in related U.S. App. 13/270,659
	9	20070005809	A1	2007-01-04	Kobayashi et al.	Cited in GB 2501471 Search Report
	10	20100302130	A1	2010-12-02	Kikuchi et al.	Cited in GB 2501471 Search Report
	11	20070244970	A1	2007-10-18	Watanabe et al.	Cited in GB 2501471 Search Report
	12	20060031779	A1	2006-02-09	Theurer et al.	Cited in PCT/EP2012/068169 Search Report
	13	20050036509	A1	2005-02-17	Acharya et al.	Cited in PCT/EP2012/068168 Search Report and ISR
	14	20040263636	A1	2004-12-30	Cutler et al.	Cited in PCT/EP2012/068168 Search Report and ISR
	15	20090046139	A1	2009-02-19	Cutler et al.	Cited in German Search Report

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	1	00/52887	WO	A1	2000-09-08	MICROSOFT CORPORATION	Cited in PCT/EP2012/068169	☐
	2	1246395	EP	A1	2002-10-02	MOTOROLA, INC.	Cited in PCT/EP2012/068169	☐
	3	1187480	EP	A1	2002-03-13	TELESUITE CORP.	Cited in ISR and PCT/EP2012/068168	☐

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	5	British Search Report dated August 28, 2012, for GB 1206841.7.	☐
	6	German Search Report dated November 17, 2011, for DE 102011055443.2.	☐
	7	Jiang et al., "A Novel Wireless Approach for Conference Projecting and Cooperating", Lecture Notes in Computer Science, Vol. 4159, pp. 688-697, 2006. (cited in GB 1206841.7 Search Report)	☐

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☒ A certification statement is not submitted herewith.

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Thomas J. Moore/	Date (YYYY-MM-DD)	2014-03-13
Name/Print	THOMAS J. MOORE	Registration Number	28974

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		(43) International Publication Date: 8 September 2000 (08.09.00)

(21) International Application Number: PCT/US00/01198

(22) International Filing Date: 18 January 2000 (18.01.00)

(30) Priority Data:

60/122,429	2 March 1999 (02.03.99)	US
09/395,508	14 September 1999 (14.09.99)	US

(71) Applicant: MICROSOFT CORPORATION [US/US]; One Microsoft Way, Redmond, WA 98052 (US).

(72) Inventor: BUTLER, Laura, J.; 411 Ward Street, Seattle, WA 98109 (US).

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Published

With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: MULTIPARTY CONFERENCING AND COLLABORATION SYSTEM

(57) Abstract

A networking conferencing and collaboration tool utilizing an enhanced T.128 application sharing protocol. This enhanced protocol is based on a per–host model command, control, and communication structure. This per–host model reduces network traffic, allows greater scalability through dynamic system resource allocation, allows a single host to establish and maintain a share session with no other members present, and supports true color graphics. The per–host model allows private communication between the host and a remote with periodic broadcasts of updates by the host to the entire share group. This per–host model also allows the host to allow, revoke, pause, and invite control of the shared applications. Subsequent passing of control is provided, also with the hosts acceptance. The model contains no fixed limit on the number of participants, and dynamically allocates resources when needed to share or control a shared application. These resources are then freed when no longer needed. Calculation of minimum capabilities is conducted by the host as the membership of the share changes. The host then transmits these requirements to the share group.

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CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

MULTIPARTY CONFERENCING AND COLLABORATION SYSTEM

Field Of The Invention

The instant invention relates to Internet and intranet multiparty conferencing and collaboration tools, and more particularly to a multiparty conferencing and collaboration tool utilizing a per-host model command, control, and communication structure which also provides pre-meeting establishment and post-meeting maintenance of application sharing by a single user.

Background Of The Invention

Real time communication is vital to the success of any business. As businesses continue to grow and develop outside the typical four walls of an office or factory, with multiple divisions located around the country and around the world, with an increasing number of employees telecommuting, and even with employees located in different distant parts of the same building, tools facilitating real time communication are becoming essential, not just for businesses to succeed, but also for businesses to simply survive. While the widespread use of local area networks (LANs), wide area networks (WANs), and e-mail has increased the productivity of many companies and individuals, such structures and tools do not provide, by themselves, the ability for real time group collaboration so essential for the success of work groups and design teams which, in turn, drives the success of businesses.

In recognition of the changing way businesses need to function to survive and prosper in this distributed environment of the world-wide workplace, the assignee of the instant invention developed and released a network conferencing and collaboration tool called NetMeeting™ 2.0. This tool provides H.323 standards-based voice and video conferencing, T.120 multipoint data conferencing including application sharing, clipboard sharing,

file transfer, whiteboard, and chat features. Application sharing is a feature of NetMeeting™ that allows a person in a conference running an application locally with local data (like Notepad™) to send the graphics of the application to the other people in the conference. The remote people see what the local person does, the title bar, the client area, obscured areas, etc. The remotes can even control the shared application, the remote person in control's keyboard and mouse drive the keyboard and mouse of the person sharing the application. This results in appearance changes, like opening a new file would, and those will be transmitted back from the sharer to the others.

These features were immediately successful in aiding the real time communication and design activity of many businesses. As companies became more and more familiar with the advantages available through such a tool, their demand for increased usage of and capabilities from such a tool exceeded even the expectations of the assignee. However, at the same time that users were demanding increased usage, they were also demanding increased control, new features, and reduced network resource and time utilization from this tool.

One of the most desired feature enhancements of this tool was to increase the number of simultaneous users who could participate in an on-line conference. However, a 16-bit version of the application sharing code, NetMeeting™ 2.0, was built on the Win 9x platform which is interrupt based for mouse and keyboard inputs. As such, and because it was based off Win3.x technology, this platform required the up-front allocation of system memory for all users. This up-front allocation of system resources required that all resources which might ever be need by the users were allocated. This was quite wasteful since a good portion of the allocated resources needed for application sharing were allocated to many users who would never share or collaborate, and were only in the meeting to view. This could total three megabytes for each user, to represent their desktop and create the required object caches. Because of this memory allocation requirement and based on estimated typical system user resources, a maximum hard limit of 32 users

was set in the system. While this was believed to be adequate for most meetings, the demand for more attendees based on the ease of communication flow soon pushed the limit beyond that which the system would allow.

Another problem which became apparent as the number of meeting participants grew relates to the network traffic generated between participants under the T.128 application sharing protocol. With increasing numbers of participants in a meeting, the number of message packets sent between these participants during operation and when a new person wanted to join the meeting increased to a point where the delay in communication and interruption of the meeting became excessive. In addition to the number of messages which were sent, the computational algorithms used were complex, adding proportionally to the amount of time needed for anything to happen. Depending on the particular connections between participants, e.g. the Internet, the delay in the meeting resulting from a new person joining could extend into the several minutes range. With this type of delay, people hang-up, lose their Internet connection, lose interest, etc.

The T.128 model utilized in this NetMeeting™ system was a global free-for-all model where all members were peers. Every person in the conference would maintain a global list, ordered from front to back of all of the shared applications of everybody in the conference, merged completely together. Each person had to be in lock-step with the others, so that the positions, order, and appearance of all shared applications were in sync. Any change in order, state, or position had to be transmitted to everyone in the meeting. This would frequently cause a Ping-Pong effect whereby the new global list would be sent, someone in the conference would decide it was out of date because their shared application had moved, and would transmit a new window list, and so forth. This problem was exacerbated by the collaboration model which also required that all members of the conference periodically broadcast his or her mouse position. This additional network traffic was necessitated by the toggle during collaboration whereby only one of the collaborators controlled all of the collaborators' mice and keyboards.

Therefore, the host would periodically need to check where everyone's cursor is positioned.

As a result of this global, chaotic model, the total network traffic could become excessive due to the amount of this circular traffic, even from members not sharing anything. All of the packets of information were broadcast, with one copy for each member of the conference. The delays resulting from this excessive network traffic caused cursor movements, especially when in control of a remote member's application, to be extremely jerky. This made it almost impossible to control a remote's application with any degree of confidence that the remote user's mouse was really where the controlling member thought it was. Further, under this model no one could do anything until all members were up to date, which further slowed the conference response time. In addition to the network traffic described above, to interpret data from a host, e.g. the drawings of an application, all members in the conference had to know about and interpret the capabilities of all other members of the conference. This drove the network traffic volume even higher, and slowed the system response still further.

Another problem which became apparent from the global collaboration model of NetMeeting™ 2.0 as the number of members in a conference grew was the control of applications which were being shared. This control/collaboration model in the T.128 application sharing protocol of NetMeeting™ 2.0 was global. Each member of the conference could start/stop collaborating. Exactly one of the members collaborating was considered to be in control. Her mouse/keyboard drove the mice and keyboards of the other members collaborating. Those other members were controlled, and their mice and keyboards were locked. However, if they were not sharing anything, the mouse and keyboard input from the person in control would go to nowhere, since the remote users were only allowed to control shared applications, and not unshared ones. This appeared to lock their mice and keyboards for no reason, which was very frustrating especially in the multitasking world of Windows™.

Additionally, anyone collaborating could become the person in control by a simple action such as a mouse click or key press. If several people took control around the same time, the last person to do so won, until the next person took control. There was no organization or order to the passing of control, it was a chaotic model. The users of the system soon termed this chaotic operation as "mouse wars." With a decent number of people in a conference, the telephone was the only way to keep things from getting out of hand. There was a lot of "OK, I am going to take control now, do not do anything anybody" discussion back and forth. Further, collaboration was a two-way street. A person might only want to control another's applications without exposing his own applications to another's control. Unfortunately, that was not possible in this model. Collaboration was all or nothing. Additionally, there was no way for a person to gracefully decline a control operation or even know that it was about to happen. Control would be yanked away without warning.

This global, chaotic collaboration model also added to the excessive network traffic described above. Each control change required some retransmitting of input state information, especially toggle keys, and discarding old accumulated input. The person in control broadcasted his input messages to everyone. All of the members collaborating played back these input messages, skipping ones that obviously would manipulate non-shared windows, and then if they ended up going to a window not shared, swallowed them at the last minute. That allowed the cursor to move, but the actual movement of the mouse notification to not get sent to the windows under the mouse if they are not shared. Further, there was required a lot of complicated token/sequence number/guessing/time stamp calculations performed to figure out who has control if several people try to take control at once, or if it is taking too long to hear back.

A further problem identified relates to the initiation of an application share for a conference. The T.128 protocol utilized in NetMeeting™ 2.0 requires two people to be in a conference before anybody could share an

application. This requirement also meant that if the second-to-last person left the conference, sharing would stop if it were ongoing. This requirement existed because starting up application sharing was a call-response process. The person wanting to share an application would broadcast an "is it ok" packet, and then wait for a response saying "sure, go ahead" before beginning the share. This turned out to be a much worse than is may have first appeared. Users wanted to be able to organize a meeting whereby they could be the only person in the meeting for a while to allow them to set up attributes, applications, and files prior to having others join the meeting. Without this capability, much time is wasted by the other meeting participants while the host completes these activities with them present.

An additional problem relates to the prior T.128 protocol for NetMeeting™ having a limit of 256 colors, 8 bits per pixel (bpp). If a user shared applications on a screen that was running at a greater color depth than 256, information would be lost. The graphics would be constrained and colors would be mapped to the closest equivalent in a 256 color palette. Simple applications did not experience much of a problem, since not many applications make full use of the available colors. The system colors and other common ones are always available. However, a high end bitmap or a web page with photos, for example, would not look good when shared. They would look posterized on the remote users' monitors.

Summary Of The Invention

In view of the above identified and other problems existing in the art, the inventive concepts and teachings of the instant invention involve the application sharing protocol otherwise known as T.128, as preferably implemented in NetMeeting™ 3.0. These protocol changes are the result of a shift from a global collaboration model of prior versions of NetMeeting™ to the "per-host model" of NetMeeting™ 3.0 and later versions. The implementation of the per-host model vastly increases the functionality and ease of use of network conferencing tools by reducing network traffic,

allowing greater scalability, providing better control and collaboration among users, allowing solitary members to begin a share without the necessity of a second or subsequent party, and supporting true color graphics.

By implementing a per-host model whereby communication with and control of the host takes place in a private fashion between the host and a remote with periodic broadcast updates by the host to the entire share group, the total number of network messages which are required to be transmitted between the members of the share group are greatly reduced. To contrast this per-host model, the prior versions of NetMeeting utilized a global model where each person in the conference would maintain a global list, ordering front to back, of all the shared applications of everybody in the conference, merged completely together. This resulted not only in a large number of messages being initially required to maintain the members of the conference in lockstep, but also had a ripple effect whereby each adjustment resulting from the reception of such a message would essentially be echoed back in a broadcast global fashion since a change had now occurred on that user's system.

In the per-host model, the network traffic almost always originates from the host only as opposed to being globally transmitted by each of the members of the conference. While multiple members of the conference may share an application, this per-host model allows each of those members who are sharing to act like a miniature server for the conference, i.e. a host of that shared application. Updates, therefore, instead of being globally transmitted by all members of the conference, simply now stream down from the host. This requires only that the members of the conference need the capabilities of that particular host. A performance improvement is particularly noticeable in the per-host model when a member of the conference is in control of the host. In the per-host model the controlling member transmits its keyboard and mouse move messages privately to the host who then periodically broadcasts the current cursor position to all members of the conference.

Industry performance data has indicated that a reduction in network

traffic of about 25% in a 5 person conference with one person sharing. This reduction increases as the number of people sharing increases, and as the number of people in the conference increases. The reduction in network traffic when someone is controlling the shared applications of another is approximately 50% or more. This reduction could be increased, however it was decided instead to increase the fidelity of the mouse moves to allow finer movements, etc. for better responsiveness. This means that many more mouse move packets are sent than prior versions to allow for this better performance. The reduction in network traffic to add a new person to the conference is approximately 90% or more when the number of existing people is 20 or greater. This reduction is truly an unexpected result which was originally met with skepticism from industry experts until confirmed with actual measurments.

At a detailed level, the following packet changes are implemented for NetMeeting™ 3.0: fewer and smaller Shared Window Lists (SWL) broadcast packets; fewer Active Window Coordinator (AWC) broadcast packets; fewer cursor broadcast packets; fewer Host Entity Tracker (HET) broadcast packets; fewer Synchronizing New Individuals (SNI) broadcast packets; fewer control arbitration (CA) packets; new control (CA30) packets; and fewer Input Manager (IM) packets. These revised and new packets, and the way that they are shared when a new member joins the conference, result in a significant reduction in traffic during application sharing just to get everyone in synchronism with the sharing application.

A further embodiment of the instant invention includes a new collaboration/control model for the application sharing protocol T.128 as implemented in the per-host model of NetMeeting™ 3.0. In the new T.128 application sharing protocol, the control/ collaboration model is per-host. As such, the host is in control not only of her shared application, but also of when and to whom control is relinquished. This allows a host to share an application without worrying about inadvertently losing control of her shared application, and also allows a host to take control of another host without

requiring that she give up control of her shared applications. This ability to designate a host's controllable status as well as the granting or denying of control to a member is effectuated through a simple process. Under this process a host may indicate that her applications are not controllable, in which case she has full control of her shared applications without further interaction or requirement on her part. Alternatively, the host may, at any time during the share, designate an application as being controllable, in which case control of her shared application may be passed to another member of the share. In this state the host may decide to pass control by her own initiation to another member of the share by offering control to that member. In this type of situation, the host invites a remote to assume control of the shared application at which point the remote then has the option to accept control or decline the offer. Until the remote has either accepted or declined the invitation to assume control of the shared application, the host has the power to revoke the invitation.

In addition to the host initiated invitation to assume control of the shared application, a remote may also request permission from the host to take control of her shared application. Under this condition the remote sends a request to assume control to the host who then has the option to either accept or decline the request for assumption of control. As with the invitation to assume control, the remote who has initiated the request has the power to cancel the request at any time prior to the host's acceptance or declination of granting control. Further, to ensure that requests and invitations do not go unanswered, the system also includes a time out function whereby a request or an invitation is only valid for a certain period of time after which the request or invitation is automatically declined. At any point during the remote control of the host's shared application, the host has the power to immediately terminate the remote's control. Further, the host also has the less intrusive option of simply pausing the remote's control temporarily while still maintaining that remote in actual control of the shared application. Once the host unpauses the control the remote then is able to pick up where she left off.

The control may also be passed from one remote to another in this preferred embodiment. However the per-host model ensures that the host of the shared application agree with the passing of control to a subsequent remote before actual control is passed to that remote. If the passing of control to a subsequent remote is agreeable with the host, control is passed to that subsequent remote. If the host disagrees with the subsequent passing of control to the subsequent remote, control stays with the initial remote user. As with requesting or inviting control from a host, a similar mechanism is utilized at the remote level for requesting or inviting control. However, the ultimate decision maker for the shared application control is the host who initiated the share.

In a preferred embodiment of the instant invention, the memory allocated to each member of the conference is now set dynamically such that each member is given a minimum allocation of memory which may be adjusted once that member begins to share. Further, since the memory allocation is now dynamic, the necessity for placing a maximum limit on the number of users of a conference is no longer required. Therefore, the system of the instant invention allows as many members in a conference as may be supported by the meeting or conference host's memory availability. As new members join a conference or as old members leave a conference, memory is dynamically allocated to or freed from that member without significant disruption to the overall operation of the system.

The new T.128 protocol of the instant invention also preferably allows a one person conference by not waiting for a response to the broadcast "is it okay" packet sent to establish a share. Instead, the new T.128 protocol assumes that sharing has succeeded if the person sharing is also the host of the meeting. This mechanism also resolves any conflict resolution problem by always working in favor of the meeting or conference host should two people attempt to share the first thing at about the same time. Further, the conflict resolution works in favor of the more senior conference or meeting member (the one who joined the meeting or conference earlier than the other) should

the conflict not involve the meeting or conference host.

Additionally, a preferred embodiment of the instant invention utilizes the new T.128 protocol to support true color application sharing in a 24 bits per pixel, non-palettized, standard interchangeable format that maps directly to the video hardware. However, while 24 bits per pixel true color is supported, it will only be sent if everyone in the conference has the capability to view it and everybody has a 24 bpp or greater display. If not everyone has a 24 bpp or greater display, the information will not be accurately displayed on their machine and, since such true color support generates a lot more data, there is no need to send such high quality video information if it cannot be viewed accurately anyway. This additional data does not affect performance much if applications such as NotePad™ are being shared. However, if a graphically intensive application is shared there may be significant performance impact. This is because a fixed amount of memory is devoted to the cached bitmaps, and the 24 bpp bitmaps are three times the size of an 8 bpp bitmap. Therefore, only one-third as many fit in the cache. This results in fewer cache hits which then necessitates the sending of bitmap bits more often. Further, since application sharing has a maximum uncompressed packet size of 32,000 bytes, it holds less true color screen data or true color bitmap cache orders, resulting in the requirement for sending more packets for the same area painted.

These and other features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

Brief Description Of The Drawings

FIG. 1 is a simplified block diagram illustrating an exemplary operating environment suitable for application of the instant invention; and

FIGs. 2a-c graphically illustrate in simplified bar chart form the dynamic memory allocation of an embodiment of the instant invention.

While the invention is susceptible of various modifications and

alternative constructions, certain illustrative embodiments thereof have been shown in the drawings and will be described below in detail. It should be understood, however, that there is no intention to limit the invention to the specific forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions and equivalents falling within the spirit and scope of the invention as defined by the appended claims.

Detailed Description Of The Preferred Embodiment

FIG. 1 in the following discussion are intended to provide a brief, general description of a suitable computing environment in which the invention may be implemented. Although not required, the invention will be described in the general context of computer-executable instructions, such as program modules, being executed by a personal computer. Generally, program modules include routines, programs, objects, components, data structures, etc. that perform particular tasks or implement particular abstract data types. Moreover, those skilled in the art will appreciate that the invention may be practiced with other computer system configurations, including hand-held devices, microprocessor systems, microprocessor-based or programmable computer electronics, network PCs, minicomputers, mainframe computers, and the like. The invention may also be practiced and distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

With reference to FIG. 1, an exemplary system for implementing the invention includes a general purposed computing device in the form of a conventional personal computer 20, including a processing unit 21, a system memory 22, and a system bus 23 that couples various system components including the system memory to the processing unit 21. The system bus 23 may be any of several types of bus structures including a memory bus or memory controller, a peripheral bus, and a local bus using any of a variety of

bus architectures. The system memory includes read-only memory (ROM) 24 and random access memory (RAM) 25. A basic input/output system 26 (BIOS), containing the basic routines that help to transfer information between elements within the personal computer 20, such as during startup, is stored in ROM 24. The personal computer 20 further includes a hard disk drive 27 for reading from and writing to a hard disk, not shown, a magnetic disk drive 28 for reading from or writing to a removable magnetic disk 29, and an optical disk drive 30 for reading from or writing to a removable optical disk 31 such as a CD ROM or other optical media. The hard disk drive 27, magnetic disk drive 28, and optical disk drive 30 are connected to the system bus 23 by a hard disk drive interface 32, a magnetic disk drive interface 33, and an optical drive interface 34, respectively. The drives and their associated computer-readable media provide nonvolatile storage of computer readable instructions, data structures, program modules and other date for the personal computer 20. Although the exemplary environment described herein employs a hard disk, a removable magnetic disk 29 and a removable optical disk 31, it should be appreciated by those skilled in the art that other types of computer readable media which can store data that is accessible by the computer, such as magnetic cassettes, flash memory cards, digital video disks, Bernoulli cartridges, random access memories (RAMs), read-only memories (ROMs), and the like, may also be used in the exemplary operating environment.

A number of program modules may be stored on the hard disk, magnetic disk 29, optical disk 31, ROM 24, or RAM 25, including an operating system 35, one or more application programs 36, other program modules 37, and program data 38. A user may enter commands and information into the personal computer 20 through input devices such as a keyboard 40 and a pointing device 42. Other input devices (not shown) may include a microphone, joystick, game pad, satellite dish, scanner, or the like. These and other input devices are often connected to the processing unit 21 through a serial port interface 46 that is coupled to the system bus, but may be connected by other interfaces, such as a parallel port, game port, or a universal

serial bus (USB). A monitor 47 or other type of display device is also connected to the system busy 23 via an interface, such as a video adapter 48. In addition to the monitor, personal computers typical include other peripheral output devices (not shown), such as speakers and printers.

The personal computer 20 may operate in a networked environment using logical connections to one or more remote computers, such as a remote computer 49. The remote computer 49 may be another personal computer, a server, a router, a network PC, a peer device, or other common network node, and typically includes many or all of the elements described above relative to the personal computer 20, although only a memory storage device 50 has been illustrated in FIG. 1. The logical connections depicted in FIG. 1 include a local area network (LAN) 51 and a wide area network (WAN) 52. Such networking environments are commonplace in offices, enterprise-wide computer networks, intranets, and the Internet.

When used in a LAN working environment, the personal computer 20 is connected to the local network 51 through a network interface or adapter 53. When used in a WAN networking environment, the personal computer 20 typically includes a modem 54 or other means for establishing communications over the wide-area network 52, such as the Internet. The modem 54, which may be internal or external, is connected to the system bus 23 via the serial port interface 46. In a networked environment, program modules depicted relative to the personal computer 20, or portions thereof, may be stored in the remote memory storage device. It will be appreciated that the network connections shown are exemplary and other means of establishing the communications link between the computers may be used, e.g. dial-up modems/xDSL/cable modems, etc.

Having now described both the problems existing in the art and a suitable environment into which the solution provided by the instant invention is preferably applied, the focus is now turned to a description of a preferred embodiment of the instant invention. As indicated above, one of the first problems identified by users of NetMeeting™ 2.0 was the scalability

problems associated with the fixed limit of 32 conference members and the static allocation of system resources driven by the Win 9x platform. A preferred embodiment of the instant invention, therefore, removes the fixed limit of users (now number of members in a conference is limited only by the available memory of the host) and utilizes dynamic system resource allocation. As these problems were resolved as will be described below, an underlying problem of excessive network traffic as the number of conference members grew resulting from the prior T.128 protocol was revealed. Therefore, a preferred embodiment of the instant invention involves enhancements to the T.128 protocol to allow for the efficient scalability of the conferencing and collaboration tool. An embodiment of the instant invention incorporating the teachings below may be found in a new release of the assignee's tool, NetMeeting™ 3.0.

Before discussing the specifics of a preferred embodiment of the instant invention, a brief overview of the multimedia teleconferencing standards is appropriate to form a foundation for the following teachings. The ITU-T T.120, H.320, H.323, and H.324 standard comprise the core technologies for multimedia teleconferencing. The T.120 standards address Real Time Data Conferencing, the H.320 standards address ISDN Videoconferencing, the H.323 standard addresses Video (Audiovisual) communication on LANs, and the H.324 standard addresses video and audio communications over low bit rate connections such as POTS modem connections. H.323 is so widespread because TCP/IP is extremely common and available for LANs, WANs, dial-up, xDSL, and all sorts of Network devices/configurations. The teachings and content of these standards are herein incorporated in their entirety by reference thereto.

The T.120 family of standards cover the document conferencing and application sharing (sometimes called data conferencing) portion of a multimedia teleconference. The recommendations specify how to efficiently and reliably distribute files and graphical information in real-time during a multipoint multimedia meeting. The objective of the standards is to assure

interoperability between terminals without either participant assuming prior knowledge of the other system; permit data sharing among participants in a multimedia teleconference, including white board image sharing, graphic display information and image exchange, application sharing; and specify infrastructure protocols for audiographic or audiovisual applications.

The T.120 series governs the audiographic portion of the H.320, H.323, and H.324 series and operates either within these or by itself. The T.120 suite consists of a series of recommendations, which are summarized as follows:

Recommendation	Description
T.120	Data protocols for multimedia conferencing: This provides an overview of the T.120 series.
T.121	Generic Application Template: This provides a guide for development of T.120 application protocols.
T.122	Multipoint Communication Service (MCS) Service Description: This describes the multi-point services available to developers.
T.123	Protocol Stacks for audiographic and audiovisual teleconference applications: This specifies transport protocols for a range of networks.
T.124	Generic Conference Control (GCC): This defines the application protocol supporting reservations and basic conference control services for multipoint teleconferences.
T.125	Multipoint Communication Service (MCS) Protocol specification: This specifies the data transmission protocol for multipoint services.
T.126	Multipoint still image and annotation protocol: This defines collaborative data sharing, including white board and image sharing, graphic display information, and image exchange in a multipoint conference.
T.127	Multipoint Binary File Transfer Protocol: This defines a method for applications to transmit files in a multipoint conference.
T.128	Multipoint application sharing protocol: This defines how

	participants in a T.120 conference can share local applications such that other conference participants can see the image of the shared application, and use the mouse and keyboard to take control of the shared application as if it were running locally.
T.134	Text chat application entity: A T.121 APE definition for a text chat protocol.
T.135	User-to-reservation system transactions within a T.120 conference: This defines conferencing reservation protocols in a T.120 environment, typically between a client application and a scheduling systems which reserves resources for multipoint control units (MCUs or "bridges").
T.136	How Remote Device Control and configuration may be performed using T.120 as the transport protocol.
T.140	Protocol for multimedia application text conversation. The protocol for text chat within T.120, goes with T.134.
T.VMR	Virtual Meeting Room control. Contains some material from previous T.13x drafts, concentrates on audio + dataconferencing.

Of the above governing standards, a preferred embodiment of the instant invention provides enhancements specifically to the T.128 Multipoint Application Sharing Protocol to substantially improve scalability. As will be described more fully below, scalability is improved by eliminating a fixed limit on the number of users, by reducing the amount of additional memory needed to hold information for a new member/collaborator/sharer in a conference, by reducing the amount of additional total network traffic amongst the members of a conference required to complete the join/collaboration/share during a conference, and by reducing the computational complexity of the algorithms used, which is proportional to the amount of time required for anything to happen during a conference.

These enhancements are embodied in a new T.128 model. Unlike the global, chaotic model of NetMeeting™ 2.0, the T.128 model of the instant

invention is a per-host model. In this model, each person hosting (sharing an application) acts like a miniature server for the conference. Network traffic almost always originates from hosts only, and wends its way down to the others viewing in the conference. Members have separate state information for each person who is sharing. The updates (shared application lists, the graphics of the shared applications, the current cursor position and shape) stream down from the host. To interpret packets coming from the host only requires the viewer to know the capabilities of the host. The network traffic from a viewer is not broadcast, but sent privately back to the host, when controlling. The rest of the members in the conference see the results (changes in appearance, movement of the cursor, etc.) which are broadcast by the host later. Since input, mouse and keyboard messages, are only sent privately from a controller to a host, the latency and responsiveness, especially of the mouse, is much improved. This is especially noticeable in large conferences since there is no performance penalty as more people participate.

Specific changes in the T.128 protocol contemplated herein which allow the realization of the advantages of the instant invention involve not sending ignored user name/capabilities in some control packets; removing/ignoring many capabilities; streamlining cache capabilities negotiation when a node starts to share, stops sharing, and when a new person joins the conference; creating caches; order encoding data each time a note starts to host, and freeing/cleanup when the node stops hosting; eliminating some packet broadcasts to everyone in the conference or replacing them with targeted sends to an individual; and a new control model and new control packets. Like file transfer (T.127), T.128 has distinct send side (hosting) and receive side (viewing) parts that compose the logical T.128 applet. In the instant invention, a node in a conference is a host when it is sharing applications or its desktop. The act of hosting or sharing is the process of trapping the graphics on the screen and transmitting the updates for the entities that are shared. There is an UI applet for hosting which basically is a

dialog that lists all of the top level applications running along with the entire desktop. This UI shows what is shared, and allows a user to share/unshare items and to stop sharing everything. This applet also allows a user to change whether the shared applications/desktop are controllable, and has other options for 24-bit color sharing and automatic handling of control requests. A node in a conference is a viewer when a remote node is hosting and it has AS active (unless application sharing is prevented by system policy). The UI for viewing may be a frame window displaying the shared contents of the remote host.

A host in a conference is controllable when it has checked Allow Control in the Conf Tools menu (or if SDK code does it pragmatically). At this point, it is possible for remote viewers to take control of it. When a viewer takes control of a controllable host, it becomes the controller of the host. When a viewer of a host becomes its controller, the host's own keyboard and mouse are locked, and input comes from the controller instead. The act of controlling is the process of sending input and window activation back to the host to drive its shared entities.

When at least one node in a conference is a host, the nodes in the conference are in a share. A share is another name for an active T.128 session. T.128 is the least T.120-ized of the standard applet protocols, since it came from a non-T.120 two person only primitive world (R.11). As such, there is some redundancy. Some of the rich T.120 primitives, like getting into conferences, exchanging capabilities, and determining the roster, are found in a more primitive form in T.128. So a share gets created, joined, and ended just like a conference does. And members are added and deleted just like in a conference.

In an exemplary embodiment of the instant invention, there are four parts to the T.128 protocol: CMG, the T.120 wiring to find out about calls and activate AS sessions; S20, the share establishment/ capabilities exchange/member join/leave/share termination part; CPC, the member capabilities data sent via S20 control packets; and DATA, the AS streaming

part, for hosting and controlling, which accounts for the capabilities of the share members so it does not send data or packets that they cannot understand. The following description of an exemplary embodiment is included by way of example, and not by way of limitation, to enable one of ordinary skill in the art to practice an embodiment of the instant invention.

CMG is utilized to find out when calls start, when calls end, and when members are added/ removed. When a new call is starting, AS receives a permit to enroll indication notification. It enrolls its application by filling in a GCC session key field with appropriate key types, capability structure, etc. as is standard. The enroll request is filled in and the application enroll method is called to enroll or unenroll in the conference starting/ending. When an enroll confirm notification is received, it looks for success or failure. If failure, it cleans up as though the call had ended. If success, it enrolls the new member and watches for the application roster report indication notifications that indicate change. Finally, CMG looks for the local node in the member list, the first time it is seen the member is considered finally to be in a T.120 call. It processes its own section, looking for new members so it can add them, and for old members now gone so it can remove them. These are GROUPWARE members only, application sharing (AS) member addition/removal comes independently through the S20 protocol. When AS finally believes itself to be in a T.120 call, it attaches to the MCS domain so it can send and receive data. When the domain attachment is confirmed, AS joins two MCS channels: its own MCS user channel; and the MCS AS broadcast channel. When both of the MCS channels are joined, the system is ready.

S20 begins where CMG leaves off. In this exemplary embodiment there are six control packets, then one for data which is used by the streaming part of sharing. All S20 packets have a header. The exemplary packet types are as follows:

S20_CREATE	Control packet to create a new share
S20_JOIN	Control packet to join an existing share

S20_RESPOND	Control packet to respond to and S20_JOIN
S20_DELETE	Control packet to eject a member from the share
S20_LEAVE	Control packet to yourself leave an existing share
S20_END	Control packet to end an existing share
S20_DATA	Data packet, the S20 part is a header

When the MCS channels are joined after a new call starts, AS broadcasts an S20_JOIN packet on the T.128 channel to join an existing share. If there is an existing share, the system will see a response on the T.128 channel, an S20_RESPOND packet with the MCS user ID as the node being responded to, from the node that created the share. Others in the share will see the S20_RESPOND also. Each will add the new member into their member lists, and if successful, each will broadcast another S20_RESPOND out on the T.128 channel. This will be ignored by the existing people in the share, since they already know about these other existing members. The remote people are added one by one this way into the new member's member list. Preferably, these messages acknowledging the new person and informing him about the existing members are only sent privately to the new member to reduce network traffic. The capabilities and user name are a couple hundred bytes of data and are included in these packets. When leaving an existing share, a node broadcasts an S20_LEAVE packet on the T.128 channel. The other members of the share will see this message and remove the member leaving from their member lists. When something goes wrong letting a new node join into a share, e.g. if a share is taking place with members utilizing NetMeeting™ 3.0 embodying the teachings of the instant invention and a member utilizing the old NetMeeting™ 2.x tries to join, the share creator broadcasts an S20_DELETE packet on the T.128 channel with the MCS user ID of the node being ejected. The share ends when the share creator leaves the share. The share creator will broadcast an S20_END packet on the T.128 channel, and the other members will clean up and terminate also.

If no share exists when a user tries to share an application, that node creates a share first, then continues with sharing the application. The node broadcasts and S20_CREATE packet on the T.128 channel. There are ways of arbitrating conflict, e.g. if two participants both try to create a share around the same time. In general, in prior systems the share is not created until at least one remote node sends back an S20_RESPOND packet acknowledging the S20_CREATE request. This is why application sharing in NetMeeting™ 2.x could only activate when at least two nodes were in a conference and application sharing capable. In the system of the instant invention, however, if the node trying to create the share is also the T.120 top provider, the code assumes success instantly since the collision arbitration algorithm will always resolve in favor of closeness to the top provider. In this way, the system of the instant invention will allow the creation of a single party share, allowing one to host a meeting, share application(s) or desktop, and have it persist. The share will create instantly, and it will not terminate when no one else except the host is left in the conference. Additionally, this method is faster for the end user who wants to share applications or desktops since it completes almost immediately.

For CPC, the member name and the member application sharing capabilities are exchanged via the S20 control packets. When a new member is added into a share list, the share capabilities are recalculated. Most of these capabilities are used to determine what kind of application sharing data to send when hosting. Prior systems used to do a lot of recalculation whether it was hosting or not. The system of the instant invention, however, only does recalculation when it is hosting, since starting to host will calculate the capabilities based off the people in the share at the time anyway. Moreover, a lot of recalculation is gone completely making it a lot faster and easier to handle a new member of the share. The total capabilities block is basically a list of the area capabilities (PROTCAPS) blocks with IDs for each. Members ignore PROTCAPS blocks with unrecognized IDs.

In prior systems when a node started to host, it would calculate the

outgoing cache sizes based on the capabilities of everybody in the share. It would take the minimum of its size and those of all the other people in the share. In the case where there are sender and receiver capabilities, it would take the minimum of its send capabilities and everybody else's receiver capabilities. When the other nodes found out that somebody was hosting, they would have to calculate what size to create the incoming caches. They would then take the minimum of the host's and everybody else's capabilities. Then, when somebody new joined the share, everybody would have to recalculate the new cache sizes again. In essence, everyone in the share had to know about each other to be able to interpret and handle the packets coming from a host. Besides being expensive to recalculate all the time, it would be impossible to ever implement lurking/passive/multicast-like application sharing. This prior system could never have implemented a streaming application session, like NetShow™ presentations or multicasted video because of the impracticability of having 10,000 people find out about each other and do calculations based off each other's capabilities.

In the system of the instant invention, when a node starts to host, it creates outgoing caches with exactly the sizes it wants, which it has specified in its capabilities already as described above. When the others find out that somebody has started hosting, they create incoming caches of the sizes specified in the host's capabilities. Further, when someone new joins the share, the existing members do not have to do a thing. The new member will find out that someone is hosting, and will in turn create incoming caches from the capability sizes. In this system of the instant invention, a viewer only has to know about the host's capabilities. The viewer creates caches based off only the sizes given in the host's capabilities. After this the process is done, no recalculation is necessary. Moreover, the outgoing caches for bitmaps/ cursors/ palettes/savebits/order encoding are created on a node when it starts to host and freed when it stops. The corollary incoming caches for bitmaps/ cursors/palettes/savebits/order encoding are created for a remote node on viewers when they find out the node has started to host, and freed when they

find out the node has stopped hosting. Prior systems used to keep the caches around for a person as long as the share existed and the person was in the share. These would be reused, in the state they were left in, if the person started hosting again. This was typically megabytes of memory to keep around. However, since new members of the share would not have the saved cache state, the contents of these caches would be wiped out anyway.

The data packets transmitted, as indicated above, are prefixed with the S20DATAPACKET structures, then a DATAPACKETHEADER. These are the stream types (dictionaries). All of the packet types are grouped into one of the few streams, the groups have much in common as far as contents and sizes, so they compress together well. The types of data packets include drawing/graphics updates sent by the host and the supported font list, which is sent by everyone in the conference to each other. While this is really a capability, it is so large (could be 32K) it is not exchanged via the S20 protocol. The data packets also include control packets, active window notification sent by the host, or activate/restore requests sent to the host, the shared window list sent by the host, the hosting state (hosting applications, hosting desktop, hosting nothing anymore) sent by the host, cursor appearance/position notification sent by the host, keyboard/mouse input sent from controller to the host, and a sync packet from existing member of a share to a new member to let the new member know that the group is aware of him and how to handle data from the group. This is needed because of cache states, order encoding data, and font lists. Further data packet include the changed capability, e.g. when desktop size/color depth changes. The compression types on the packet data include: not compressed; PKZIP compressed, but atomic, no info about previous packets is need to decompress; and persistent-PKZIP compressed, information about previous packets sent on same stream is needed to decompress.

As compared with the prior versions of NetMeeting™, the system of the instant invention provides fewer and smaller Shared-Window-List (SWL) broadcast packets. These packets provide notification of the list of shard

window states, positions, sizes, along with areas that are obscured, if anything has changed since last time. In the prior systems, the SWL packets were sent by people hosting, and by non-hosts if they were in control so that everyone else would sync to the placement of shadows on their system. Shadow windows, representing shared information from other people, were always included in the list as well. When joining and leaving, an empty packet was always sent, even if the member was not hosting. There were lots of packets dropped due to collisions in z-order when multiple people were hosting, or packets applied and then another z-order packet would be sent out in a Ping-Pong effect. Now, only the host sends the SWL packets, the contents of which are simply windows shared on the host, and things that obscure parts of the shared windows. Therefore, when not hosting and joining/leaving share, no packets are sent. Further, z-order is not changing all the time because a plurality of shadows are not changing independently as before.

In addition to the fewer SWL packets, the system of the instant invention also provides fewer Active-Window-Coordinator (AWC) broadcast packets. These packets provide notification of the currently active shared window (or NULL if none), if this window has changed. These packets also provide requests to activate/minimize/change state of a shared window. In the prior systems, the current active window was sent out periodically, even when not hosting. When hosting there were many different states, and applying notifications/requests from remotes would often cause another packet to be sent in a Ping-Pong effect. Additionally, there were requests to simulate tray behavior (right clicking on tray button for shadow of shared window would cause system menu to popup on host if in control), to close and minimize windows. In the system of the instant invention, notifications are only sent by hosts about currently active window. There is no need to distinguish different types of "no shared window" active cases, meaning fewer broadcasts. Only shared window or nothing is sent. Requests are only sent from the controller to the host to activate/unminimize shared window, or to inject Ctrl+Alt+Del in case of NT Remote Desktop Sharing (RDS). RDS is a service process that

uses application sharing to share the entire desktop of a machine back to whomever called in. Ctrl+Alt+Del simulation is needed on NT because that is the way a user logs in, shuts down, or locks the workstation.

The system of the instant invention also provides fewer cursor broadcast packets, which provide current cursor image and position if either has changed. In the prior systems, the current cursor position was sent out periodically by everyone, as was the current cursor image. Depending on the control state, a node may have sent out a cursor broadcast or an input broadcast. With the system of the instant invention, only the host sends the cursor shape and position. If a host is controlled and its cursor position is out from the last know controller mouse position, a sync bit is added to the cursor position broadcast. The controller will, upon seeing this set, move his mouse to the cursor position given by the host.

The system of the instant invention also provides fewer Hosted-Entity-Tracker (HET) broadcast packets, which provide notification of current hosting application/desktop value. Before, when sharing applications the current top level shared window count was sent out. Every time a window came or went, another new count was broadcast. However, remote viewers only cared when the count transitioned to or from zero. Therefore, the system of the instant invention only sends changes from zero to non-zero (hosting applications/desktop), and from non-zero to zero (stopped hosting). The intermediate counts are useless and were ignored by the remotes, so they are no longer sent.

The system of the instant invention also provides a significant reduction in the number of Synchronizing New Individuals (SNI) broadcast packets. These packets indicate a member joining, and are sent on each stream by each existing person when a new person joins into the T.128 share. They tell the new person that the sender knows he is present, that any data from that point on takes the new person's capabilities into account, and that the new person can now process packets from the sender. These must be sent and handled before anything can continue in the share. In prior systems, when

a new person joined a share, everybody in the share would loop through everybody else in the share, and for each person broadcast a sync packet per stream. These broadcasts would happen for each stream, and there were five streams, although two of those were not really used. This meant that the prior system was synching streams that data was never sent on. Now, however, the people in the share only broadcast one packet apiece per stream a packet for the new member joining. The new member joining then broadcasts a packet for each person already in the share. In other words, application sharing nodes need to send a sync packet to people who are new to them in the share. Further, the number of streams of concern have been reduced from five to three. A sync is sent only on a stream when data is needed to be sent on it, which reduces the number still further to one for people who are just viewing.

The system of the instant invention also provides fewer Control Arbitration (CA) packets, which provide notification of the current collaboration state (detached, collaborating, controlled, in control), and which provide requests to control, grants of control handled by the node currently in control. In prior systems control was global whereby all nodes collaborating are controlled by mouse and keyboard of the node in control. Nodes could be controlled (locked) even if they were not hosting. They would play back the mouse/keyboard input, only to discard it at the last second since it should only be played back to shared applications. Every state change was broadcast, and all nodes, whether hosting or not, needed to broadcast state changes. If a packet could not be broadcast (low memory or simply too much traffic), state change would not occur. This would result in a controlled node remaining frozen, unable to use his mouse or keyboard, for a long time until it could get a packet out. Now, the control state is broadcast from hosts only when allowing control state changes or when start/stop controlling. Control operations (taking control, releasing control, bouncing control, etc.) are private between host and another node and are not broadcasted.

The system of the instant invention does provide additional new control (CA30) packets, which provide request exchanges to take control, release

control, bounce control, invite control, pass control, etc. The new control model is similar to the calling model whereby a node asks to take control of a host like placing a call to a remote. The node gets back a response (no with reason or yes). Until this response, the node can time-out or cancel the request on the viewer side. The host can allow the end user to accept or reject the incoming take control request. Either side can hang up, the controller can cancel or release control and the host can bounce control. this works locally even if packets cannot get out. Even if the system runs out of memory completely, the local node will not be stuck in a state it does not want to be in. Further, hosts can invite viewers to control them, like inviting a remote to join a conference.

In addition to the above, the system of the instant invention also provides fewer Input Manager (IM) packets. In prior systems, the person in control if collaborating, or any detached host, broadcasted input packets every mouse move/click/keypress. Everyone not collaborating treated these like notifications, and updates the keyboard state table/mouse position of the sender (and all controlled nodes if from person in control). Everyone collaborating treated these like requests and injected the input into their machine. This would be horribly slow in a large conference if a controller moved the mouse a lot. NetMeeting™ 2.x collapsed the mouse packets which resulted in jerky and unresponsive cursor movement. In the system of the instant invention, input packets are sent privately from a controller to a host, not broadcasted. The controlled host then periodically broadcasts the new cursor position/shape due to the input played back from the controller. This allows multiple hosts to be simultaneously controlled by multiple independent users. The result in very high mouse fidelity and lower bandwidth in a large conference.

The result of these changes is a substantial reduction in network traffic from existing NetMeeting™ 3.0 nodes when a new person joins a share, especially from these node that are not currently sharing. Each node was sending a lot of packets that were ignored on the remotes or did not benefit

anything. Now, when a host starts sharing the process is greatly simplified. With 50 people in a conference, e.g., the traffic to get everyone in sync shrunk from 12,851 broadcasted packets to only 265 broadcasted packets.

As an example illustrating this simplification, assume that six people are in a conference, having already exchanged capabilities and fonts, and a host starts sharing his desktop. The host broadcasts an application sharing S20_CREATE packet (which includes his name and AS capabilities). In response, five other users respond by broadcasting an S20-JOIN packet with their name and AS capabilities. For each person who joins the share, the host will perform a sanity check of the viewer's capabilities, and if there is a problem, will broadcast an S20_DELETE packet for that viewer. Assuming all is well, the host creates a person structure with the minimum amount of system resources necessary to view. The host then resets its caches (palette, graphics), and broadcasts a sync packet. The host then entirely repaints that which is shared. After this, the host retransmits its state (HET) indicating what he is sharing (desktop, application, not). After this the host sends its font packet, and waits for the viewer's font packet.

On the viewer's side, once the S20_CREATE packet is received, a sanity check is performed on the capabilities. If all is well, the viewer replies with an S20_JOIN broadcast. At this point, the viewer and host are in a share. The caches are reset, a sync packet is sent to the creator, and the font list is sent. The viewer then receives the sync from the host, the font packet, and the desktop or application HET. The viewer then creates cursor cache, a palette cache, and a bitmap cache all of size the host said. The viewer then creates the compression saved history and the order decoding structures and memory. Finally, the viewer creates a bitmap for that person's desktop, or window to view what's shared. When the viewer wants to stop viewing, he sends a HET packet indicating that nothing is shared. The viewer then destroys the window, and frees the blocks shared. However, the viewer stays in the list.

During application sharing, it is instructive to note what is needed for a viewer to represent what is on the host's screen, utilizing desktop sharing as an

example. First, the viewer needs to be able to recreate the graphics on the host's screen. This includes the cursor (logical position, image, current location, etc.), as well as the palette (were true color cannot be supported as described below). This was needed to allow translation of palette code to actual color in 256 color applications. The alternative would be to take a bitmap of the desktop. However, since this could be approximately one megabyte of data, the transmission of palette codes saves greatly. The viewer would also need to recreate the text (font, language information ,local information, character set information, multi-national information, Unicode, etc.). If a viewer does not have the font, the host does not send text drawings to the people in the conference at all. If text is put up by a shared application using a font that is not available on all remote viewers, a bitmap of that part of the screen is sent instead. While this is a lot bigger than a simple text drawing description, it is safe and can be handled by everyone in the conference. This is what application does in general when there is no commonality, it falls back to screen data. The viewer also needs the bitmap cache (toolbar images, etc.) and the order encoding cache. The host sends only change of drawing unit of the type. The header for each drawing unit indicates the field types that are being sent. If these are not there, then they are the same as the previous one. When someone joins a share, the host invalidates the entire screen and forces a refresh (repaint from scratch). Then the caches are rebuilt.

For application sharing, the host needs to represent the window to the viewer, with a list of what is shared, the z-order, the shape and position of each window, and what is currently active. When the host is being controlled by a remote, he uses a control timer mechanism to ensure that other viewers' screens are kept up to date. Therefore, the playback of input first processes fast input such as the mouse clicks, cursor position and shape. Next, the window list for application sharing indicating what and where things are is processed. Finally, the graphics are processed, including the list of orders and screen data. If, for any reason, the window list or graphics cannot be sent, they are skipped so that the fast input may again be processed.

As indicated above, the new collaboration model of the instant invention, preferably implemented in NetMeeting™ 3.0 application sharing, is per-host. By collaboration it is meant the process of allowing, inviting, granting, and revoking control to others of shared applications. This new model is developed to go along with per-host application sharing described above. In the previous versions of the application sharing protocol, T.128, collaboration was global as described above. Each member of the conference could start/stop collaborating. Exactly one of the members collaborating was considered to be in control. Her mouse/keyboard drove the mice/keyboards of the other members collaborating. Those other members were controlled, and their keyboards/mice were locked. However, if they weren't sharing anything, the mouse and keyboard input from the person in control would go to nowhere, since we only let the remotes control shared applications and not unshared ones. So their keyboards/mice were locked for no reason, which was very frustrating especially in the multitasking world of Windows.

Anybody collaborating could become the person in control by a simple action (a mouse click or key press). If several people took control around the same time, the last person to do so won, until the next person took control. There was no organization or order, it was a chaotic model, our users called it "mouse wars". With a decent number of people in a conference, the telephone was the only way to keep things from getting out of hand. There was a lot of "OK, I'm going to take control now, don't do anything anybody" discussion back and forth.

Collaboration was a two-way street. A person might only want to control another's applications without exposing his own. But that wasn't possible in this old model, collaboration was all or nothing. And there was no way for a person to gracefully decline a control operation or even know that it was about to happen--control would be yanked away without warning. This application sharing control model (a.k.a. Collaboration) is unfriendly to shared app the hosts, controllers, other meeting participants, and SDK clients. The model is a global free-for-all, with no reliable way of denying, canceling, or

undoing dangerous operations via the user interface or driving code. These problems are parallel to those people used to have with shared app views. Each person in the conference had "shadow windows", representing a top level shared window from a host. People could not move them, size them, get them out of the way, or put them back in the way when desktops were of different sizes, or change the z-order.

In this old control model, "Collaboration", means a user's mouse and keyboard are synchronized with those of all other members in the conference who are collaborating. The person in control is in control of all the other people collaborating, and his input is played back on all of those other machines. In NetMeeting™ 2.x, a user could collaborate and be driven even if he were not sharing anything. This ended up being for no reason, since all of the played back input would eventually be discarded. Pressing the "Collaborate" button would do one of several somewhat unpredictable things depending on the state of the user and other people's states. It would either cause the user to start collaborating, to take control if already collaborating, or to stop collaborating.

In this prior system, as indicated above, collaboration is GLOBAL to the conference. Collaboration is a set of states, detached or cooperating, and then in control only if cooperating. When the state changes, several broadcasts from different people occur. The potential controller broadcasts "cooperating" to start collaborating if he isn't already, the potential controller broadcasts "request control" to take control, and the current controller broadcasts "granted control" to the potential controller. Of the members collaborating, one and only one person is in control. That person's mouse and keyboard drive the mice/keyboards of the other members collaborating. Each control change requires some retransmitting of input state information, especially toggle keys, and discarding old accumulated input. The person in control broadcasts his input messages to everybody. Then all the people collaborating play back these input messages, skipping ones that obviously would manipulate non-shared windows, and then if they ended up going to a

window not shared, would swallow them at the last minute. That allows the cursor to move, but the actual movement of the mouse notification to not get sent to the windows under the mouse if they are not shared. Additionally, there was a lot of complicated token/sequence number/guessing/time stamp calculations done to figure out who has control if several people try to grab it at once, or it was taking too long to hear back. Further, taking control was a free-for-all as indicated above, anybody could take it away from the controller at any time. This often resulted with somebody in control even if there was nobody else to be controlled.

As may be apparent from the forgoing, the prior system had many areas of improvement available. Since collaboration was global, it only worked when the shared application pool was global, all in same relative place on everybody's screen. Further since collaboration was bi-directional, taking control of another's shared applications also left that user open to being controlled. Collaboration was also quite noisy, requiring several broadcasts from an individual when his state changed. To take control required three broadcasts: cooperating, request control from person taking control, granted control from person handing off control. This collaboration was also end-user chaotic, wherein everybody could take control, the last person to do so wins, which resulted in a big user interface free for-all. This collaboration was also SDK chaotic, wherein there was no way for SDK code to do conference management and get notified in real time or confirm/deny control changes. Additionally, the collaboration was not easily undoable, in that the hosts could not "bounce" the current controller while staying "controllable" for somebody else, and the controllers could not "let go" of a host without going back to the main NetMeeting™ 2.x UI and pressing the Collaborate button some random number of times. Collaboration was also not deniable, in that the hosts could not choose to accept/deny a request to take control. Nor was collaboration cancelable, potential controllers could not cancel a pending take control operation if it was taking a long time, e.g. in a large conference.

As indicated above, the new control/collaboration model of the instant

invention is per-host, a nice parallel to the new T.128 protocol. Control, rather than being global, is per-host. Each the host can be controlled by one the remote, and several the hosts can be controlled in parallel by several distinct the remotes. A member can be a host and be able to control another without opening up his own shared applications to control. However, one can not be in control of a host and controlled by another the remote at the same time. Control can be initiated, canceled and refused on either side (the host and the controller). It can be handed off to a third party. There is graceful timing out and failure handling. Both the controller and the host can continue in low memory or stress situations. Although round-trip communication between a host and a the remote is required, either side can move on and do something else without waiting to hear from the other. The user interface is also unintrusive, dialogs are not modal and hang around for a while before timing out so end user can handle them as is convenient.

The person in control sends all his input messages, mouse and keyboard, along with other information needed for states, like IME keys and TOGGLE keys, to the person controlled, privately or per-host. The person controlled plays back this input, and attempts to prevent any from going to windows/applications that are not shared. That way a controller can not actually cause a click in a non-shared application. The person controlled's mouse will move in sync with the controller, it must for dragging and other operations, but the actual mouse moves are not passed to the applications.

The controller's system does spoiling and other massaging of the input to send. For example, to prevent applications from going into drag-drop mode, application sharing waits a bit after a mouse button down looking for a mouse button up. That way the down/up go in the same packet and are played back quickly, creating a click. If the down/up were split up, the time latency is such that many applications including the explorer itself would assume the mouse was going to be used for dragging something. A corresponding example would be key downs/ups, to avoid simulated repeats, or duplicate keys caused by Windows itself generating other key sequences in the default

window handler. And since mouse moves can be discarded, if outgoing packets start to backup, they can be combined. This may somewhat increase jerkiness on the remotes, but this is better than getting stuck because so much outgoing traffic is generated that nothing else can get sent.

There is corresponding code on the controlled side to playback the input. Events at several levels have to be discarded, and there are some exceptions for discarding events with screensavers, other desktops, and system dialogs like the fault error message. The input must be played back with roughly the same time differences as it occurred on the controller. These cannot be input into to the OS all at once, since Windows™ will do different things based off the system keyboard state.

Basically, there is a pretty well-defined sequence of network traffic with control. The controller sends input events to the controlled person. The controlled person then broadcasts notifications to everybody in the conference of cursor position/shape changes and window position/appearance updates caused by playing back the input from the controller. Operation of this new control structure may be better understood from the following simple examples of how this new model works. Note that a host is a conference member sharing applications/desktop.

To indicate controllability, the host broadcasts a control state packet, with control allowed or not allowed. The remotes can use that as indication about whether to permit users to try to take control of the host via UI. To take control of a host from a the remote, the remote user selects UI like menu command (or code makes function call). The remote sends a take control request to the host. The remote waits to hear back yes/no from The host. At this point, the remote can either cancel the take control request or do some other control operation which will also cancel this one. The host displays a take control request UI to the end user (or not if unattended or passes to code to handle). The user can say yes/no. This UI is not modal, it can sit until the end user is ready, although it may time out and act like user said no. The host sends a take control reply to the remote with the yes/no result. The second

this happens, if yes, the host is controlled by the remote.

To grant control of a host to a the remote, the host user selects UI (or code makes function call). The host sends an invite control request to the remote. The host waits to hear back from the remote. At this point, the host can either cancel the invite control request or do some other control operation which will also cancel this one. The remote displays the invite control request UI to the end user (or not if unattended or passes to code to handle). This user can say either yes or no. This UI is not modal, it can sit until end user is ready, although it may time out and act like user said no. The remote sends a invite control reply to the host with yes/no result. The second this happens, if yes, the host is controlled by the remote.

If the host wants the controller bounced (hitting ESC key on the host is UI for this), the operation occurs immediately and then the host sends a bounce control inform message to the remote. If the controller wants to let go of the host, the operation occurs immediately and then the remote sends a release control inform message to the host.

If the host is controlled but the user needs to handle something temporarily, like a call dialog or a popup from some other application, the host sends a pause control inform message to the remote. The remote stays in control but can tell the user that the mouse/keyboard will not do anything until unpaused. When the user is done, the host sends an unpause control inform message to the remote, and they pick up where they left off.

To pass control of a host, the remote sends a pass control request to the host. At this point the remote is no longer in control, i.e. the remote can not undo or take back the pass control request. This is different than requesting or inviting control. The reason for this is to avoid long stacked-up sequences of people in the conference waiting for each other to take their respective actions. With control, it was decided to only allow dependencies between a host and a viewer, none between different viewers. This avoids deadlocks and jams for long periods of time. The host displays a pass control request UI to end user, who can say yes/no. If the host user says no, the host sends a pass

control reply with failure immediately to the second remote. If the host user says yes, the host forwards a pass control request to the second remote. The host waits to hear back from the second remote. At this point, the host can either cancel the pass control request or do some other control operation which will also cancel this one. The second remote displays the pass control request UI to the end user, who can say yes/no. The second remote sends the pass control reply to the host with the yes/no result. The second this happens, if yes, the host is controlled by the second remote. Otherwise, the host remains in control.

As may be apparent from the foregoing, control is made per-host, with cancelable control request, via controller UI and controller SDK code (auto and confirm mode), confirm/deny control request, via host UI and the host SDK code (auto and confirm mode), and undo-ability of control by both controller and controlled the host, via UI and SDK code. With this, the moderation/control/floor model can be managed on a per-host basis.

Therefore, the system of the instant invention provides collaboration/control which is per-host in the conference. There is no collaboration anymore; there is "controlled" (the host) and "controlling" (the viewer). The hosts can turn on/off allowing control. Only the hosts which have allowed control can be controlled. Somebody not sharing is not a host, and therefore can not allow control nor be controlled. Taking control of a host does not open oneself up to being controlled (control is now unidirectional). Control is a privately negotiated contract between the host and the viewer, which once negotiated, cannot be randomly interrupted by a third member of the conference. Further, the hosts can grab control back from a controller without asking, and a controller can release control of a host without asking. Any third party who wants to control a host can not succeed until either the host or the controller breaks the control bond.

State changes (allow control state and being controlled by x) are broadcast from the host sometime after changes actually happen. If a viewer is controlling a host, he can not be taken control of, and if a host is controlled,

he can not take control of somebody else. Further, a viewer can not control more than one host at a time, and a host can not have more than one controller at a time. To take control of a host, a potential controller sends the host a private request with an unique ID (unique to controller) identifying the request. The controller then goes into a "waiting to hear back" state during which the controller can release control, since "release" will follow the "take" request. Once the request is received, the host responds privately to the controller with "accepted" or "rejected". If accepted, the host then broadcasts state change some time later after receiving this information from the controller. During this state, the controller or the host can break the control bond at any time. If the controller breaks this bond, he sends the host privately a "released" notification, whereas if the host breaks it, he sends the controller privately a "bounced" notification. In all cases the request ID is remembered and used to identify the "control bond". This allows multiple/queued requests to be generated and responded to, ensuring the proper state on both sides when done. The hosts/controllers ignore out-of-date requests.

During the controlled period of a host, broadcast notifications involving the controller are ignored by the controller, since this controller always has more up-to-date information about his own state. If a host stops the hosting, then control state is automatically cleaned up. Likewise, if a host leaves a conference, then the host stops the hosting, and control state is automatically cleaned up. Otherwise, a controller can rely on always getting a response from the host before continuing. The controller should not send input to the host until an "accept" response has come back because the input packets do not have request IDs in them, and the host can not tell if they are out of date or not.

Everyone must handle UINT wrap-around. Allocating/sending packets can fail. For notification broadcasts, the host periodically checks if the current state (allow control/controller/requestID) is different than the last one sent. If so, the host simply tries to send new packet. For private controller/controllee

communication, it's more complicated. Unlike notification broadcasts, these can not be "spoiled". They must be queued if they can not be allocated/sent. As such, controller/host states do not change until these queued packets are sent. The one exception is "waiting for control", which happens as soon as possible as a take control request occurs, flushed or not.

If the user turns off allowing control, queued request responses are all turned into "denied-control not allowed" responses. Also, request responses following a queued "accept" must all be "denied" responses. If the user turns off allowing control, current controller is bounced as well. If the user tries to take control of a second host when a take control request is still queued, the first one is superseded. In other words, only one take control request will ever be queued. The user can release control of a host with a take control request queued. If that happens, the release simply cancels the queued take. If the user tries to take control of a host when an earlier take control request has been sent but has not yet been responded to, the first one is canceled by a "release" packet. In the meantime, the controller can do whatever it wants when waiting to hear back. A preferred embodiment of the instant invention includes a message box with a "cancel" button. Likewise, the host can do whatever it wants when it receives a "take control" request, provided it follows the rules. In a preferred embodiment, a message box with "person x would like to take control, ok/cancel" is displayed, and incoming requests are handled in order of receipt. Further, the system may, via SDK code, decide that the new controller is the one, bounce the current one, and allow the new user to take control. Further, as described above, it could remotely push control by asking a remote to take control of it.

Another advantage of the system of the instant invention is the dynamic allocation of system resources. Unlike the prior systems that allocated all of the memory which could ever be needed for each member of a conference, the system of the instant invention allocates system resources dynamically as the members require them, and then frees up those resources when they are no longer needed. Application sharing takes a lot of memory to

trap the graphics on the screen, utilizing a big enough buffer to make that a useful amount so that the system can look backwards in the buffer to minimize the amount of data which is actually sent.

As an example, if a rectangle is painted over, it does not need to be sent since the user cannot see it anyway. Additionally, if a circle is painted blue and then painted green, the system only needs to send the green information since the painting blue is hidden from the viewer. In this way, the amount of memory needed to view may be substantially reduced from that which you need to share. By separating out what one needs to view from what one needs to share yourself, the memory allocation to viewing members may be minimized, until one of those viewers starts to share. At that point, his memory allocation will be increased to accommodate the sharing requirements. When that person stops sharing, the additional memory allocation is then freed for utilization by that user for other purposes.

This dynamic memory allocation may be better understood with reference to FIGs. 2a-c. FIG. 2a illustrates in simplified bar chart form the memory allocations within the host 60, viewer A 62, and viewer B 64. As may be seen, within the host 60 memory has been allocated for itself 66, for viewer A 68, and for viewer B 70. Likewise, within viewer A 62 memory has been allocated for the host 72, itself 74, and viewer B 76; and within viewer B, memory for the host 78, viewer A 80, and itself 82.

If the host now passes control to Viewer A 62, dynamic memory allocation is accomplished as illustrated in FIG. 2b. As may be seen, upon passing control to Viewer A, the host 60 allocates additional memory 84 for itself to process the inputs from Viewer A who is now in control of the shared applications. Likewise, Viewer A 62 also dynamically allocates additional memory 86 for itself to allow it to control the host. Viewer B's memory allocations remain unchanged.

FIG. 2c illustrates the dynamic freeing of memory when control is passed back to the host 60 from viewer A 62. As may be seen, the memory allocations return to their pre-controlled states once control is passed back to

the host 60.

Another problem with the prior systems lies with their requirement of at least two users existing in a conference before application sharing is allowed as described above. The system of the instant invention changes this operation by allowing a single user to initiate and conduct a share, with no other members of the conference being present. This is accomplished by not requiring the system to wait for a response. Instead, the system assumes that the sharing has succeeded, if the person sharing is also the host of the meeting. This operation is operates properly because any collision resolution (two people attempt to share the first thing about the same time) works in favor of the host always. With this embodiment of the instant invention, a host can share an application, or several applications, and unshare them too, when he is the only person in a call. Therefore, a host can share an application, share Notepad, and collaborate, e.g., then people can call the host, hang up, and call back as many times as they like, and the shared applications and collaborate state will persist. In prior systems, a person could host a meeting and share one thing. However, that one thing was not really shared, instead it was queued up to be shared when a second person joined the call. the share button stayed disabled until that happened.

This operation was due to the application sharing protocol. When creating a share, an S20_CREATE packet was broadcast to the application sharing channel. Until an S20_RESPOND or an S20_JOIN packet was received from some other party, the share was not considered to have been created. This operation is no longer required when the creator is the top provider. Instead, the system assumes that the second the T.120 objects are had all is well. The host does not have to wait for a response from someone else. As indicated above, this works well because if the top provider and someone else ever tried to create a share around the same time, the top provider always won. When a host has shared an application alone in a conference, there is still work being performed. All of the drawings are being accumulated, but they are not going anywhere. Additionally, no periodic

calculation are happening. However, once someone else joins the share, the system proceeds as described above.

The system of the instant invention also provides true color 24bpp support through the enhancements provided to the T.128 protocol by the instant invention. As indicated above, true color application sharing is a 24bpp, non-palettized, standard interchangeable format that maps directly to the video hardware. The prior systems utilized 8bpp data which is a palettized format. To accomplish this true color application sharing, capabilities were added, negotiation of color depth to support this new capability and handle people with it properly was fixed, and the bitmap caches were revised to handle the larger memory requirements of bitmaps three times the size of those at 8bpp. Further, information was added to the drawing packets so the graphics of shared applications could be presented accurately.

True color data will only be sent if everyone has the capability to view it and everyone has a 24bpp or greater display. The reason for this is that a display of less than 24bpp will not accurately display 24bpp information. Even 16bpp (32,767 colors or 65,535 colors on NT) cannot display 24 bpp data properly because parts of the value get stripped, resulting in subtle green/blue/or red shifting, though not as extreme as today. The purpose of true color is to view accurately high color images. Therefore, is should not be utilized in circumstances where the fidelity of the results is questionable. Further, it generates a lot more data even if a member is not really sharing anything that requires it, hence the restrictions.

There is not much of a performance impact if a member is sharing an application such as Notepad™, since almost everything goes as orders which are the same size regardless of the bit depth at which it is sent. However, if a member is sharing a graphically intensive application, there may be quite an impact. This impact effects both the amount of data sent and the latency. This is because a fixed amount of memory is devoted to cached bitmaps. In true color, the bits are three times the size as 8bpp. Therefore, only one third as many entries fit in the cache, meaning that we get fewer cache hits and

must, therefore, send bitmap bits more often. Additionally, application sharing has a maximum uncompressed packet size of 32,000 bytes. That holds less packets for the same area painted. Further, there is less compression of true color screen data. The specialized algorithm to arrange the bitmap bits so they compress even better than just PKZIP only works for 4bpp and 8bpp data. PKZIP can only look back a fixed amount of bytes in the data, so sequences of the same color block do not shrink as well.

When supporting true color 24bpp, the system does not distribute any palettes/color tables. When the color depth changes because someone leaves the conference, the system forces a repaint of the shared information. Prior systems did not do this even when switching between 4bpp and 8bpp, which resulted in some remotes seeing weird artifacts. Additionally, an unused field in orders packet is used to specify the sending color depth that they were generated for. Screen data has the color depth, so users know what to do with it, but orders did not. Under the prior system, users would not know whether to map a color to the closest palette entry or just use it plain. With the system of the instant invention, the drawing operations may be replayed properly. Further, the system of the instant invention will not compress any packet less than 256 bytes (prior system constant set at 128 bytes). Additionally, the system will persistently PKZIP packets less than or equal to 4k, which is the amount of persistent dictionary data saved. As it turns out, most packets larger than 256 bytes but smaller than 4k contain drawing orders.

In a further embodiment of the instant invention, the system dispenses with the exchange of capabilities and fonts. This allows true multicasting to take place (lurking). In this embodiment of the instant invention, the host simply transmits a periodic refresh, at which point he clears his cache and begins to rebuild them and forces a complete repaint of his screen. Since fonts are no longer exchanged, just images are sent to populate the cache and allow proper display on the viewer's screen (cache font glyphs). This elimination of capabilities and font exchange allows streaming of data to thousands of users which would otherwise be nearly impossible to complete.

Numerous modifications and alternative embodiments of the instant invention will be apparent to those skilled in the art in view of the foregoing description. Accordingly, this description is to be construed as illustrative only and is for the purpose of teaching those skilled in the art the best mode for carrying out the invention. Details of the structure and implementation of the various components described above can be varied substantially without departing from the spirit of the invention, and exclusive use of all modifications that come within the scope of the appended claims is reserved.

What Is Claimed Is:

1. A method of sharing an application program or desktop between a host of a multipoint data conference and a plurality of conference participants, comprising the steps of:

calculating within the host minimum capabilities of all conference participants in the share;

broadcasting from the host to the conference participants in the share sizes of caches required to view the shared information based on the calculated minimum capabilities;

establishing within the conference participants caches as required by the host.

2. The method of claim 1, wherein a new conference participant joins the share, further comprising the steps of:

re-calculating within the host minimum capabilities of all conference participants in the share including the new conference participant;

broadcasting from the host to the conference participants in the share sizes of caches required to view the shared information based on the calculated minimum capabilities;

establishing within the conference participants caches as required by the host.

3. The method of claim 2, further comprising the steps of:

broadcasting a sync packet to the conference participants;

repainting the shared information based on the re-calculated minimum capabilities.

4. The method of claim 1, wherein a conference participant leaves the share, further comprising the steps of:

re-calculating within the host minimum capabilities of all conference participants in the share excluding the conference participant who has left the share;

broadcasting from the host to the conference participants in the share sizes of caches required to view the shared information based on the calculated minimum capabilities;

establishing within the conference participants caches as required by the host.

5. The method of claim 4, further comprising the steps of:

broadcasting a sync packet to the conference participants;

repainting the shared information based on the re-calculated minimum capabilities.

6. The method of claim 1, wherein the steps of calculating within the host minimum capabilities of all conference participants in the share and establishing within the conference participants caches as required by the host precludes calculation of minimum capabilities of all conference participant within the conference participants.

7. The method of claim 1, further comprising the step of transmitting privately a request to control a shared application between the host and one conference participate.

8. The method of claim 7, further comprising the steps of:

passing control of the shared application to a conference participant;

transmitting privately control commands for the shared application between the host and the conference participant in control of the shared application; and

periodically broadcasting from the host updates to the shared application program to all of the conference participants.

9. The method of claim 8, further comprising the step of ignoring within the conference participant controlling the application program the broadcast update from the host.

10. The method of claim 8, wherein the step of periodically broadcasting updates includes the step of periodically broadcasting updates with a sync, further comprising the step of updating the shared program information within the conference participant controlling the application program.

11. The method of claim 1, further comprising the steps of:

receiving a join request from a new member;

broadcasting a respond packet from the host;

adding the host to a member list within the new member in response to the respond packet from the host;

adding the new member into a member list within each of the conference participants in response to the respond packet from the host;

broadcasting a respond packet from each of the conference members;

adding each of the conference members to the member list within the new member in response to the respond packet from each of the new members; and

ignoring within each of the conference members the respond packets from each of the conference members already included in the member lists.

12. The method of claim 11, wherein the step of broadcasting a respond packet from each of the conference members is broadcasted only on a single channel.

13. The method of claim 1, further comprising the steps of:

receiving a leave broadcast packet from one of the conference members; and

deleting the conference member who broadcast the leave packet from a member list in each of the conference members.

14. The method of claim 1, further comprising the steps of:

receiving a delete broadcast packet from the host identifying a conference member; and

deleting the conference member identified in the delete packet from a member list in each of the conference members.

15. The method of claim 1, further comprising the steps of:

receiving an end broadcast packet from the host; and

deleting caches required by the host; and

deleting a member list of all participants in the share.

16. The method of claim 1, wherein the step of calculating within the host minimum capabilities of all conference participants in the share includes the step of calculating the minimum capabilities of all conference participants and the host.

17. The method of claim 1, further comprising the steps of:

receiving a join request from a new member;

broadcasting a respond packet from the host;

adding the host to a member list within the new member in response to the respond packet from the host;

adding the new member into a member list within each of the conference participants in response to the respond packet from the host;

transmitting privately a respond packet from each of the conference members to the new member; and

adding each of the conference members to the member list within the new member in response to the respond packet from each of the new members.

18. A method of establishing an application program share session in a multipoint data conference, comprising the steps of:

generating a create share message;

assuming success of share session without waiting for a response to the create share message.

19. The method of claim 18, further comprising the step of hosting a multipoint data conference, and wherein said step of assuming success is accomplished during said step of hosting.

20. The method of claim 19, further comprising the step of admitting a first multipoint data conference participant, and wherein said step of assuming success is accomplished prior to said step of admitting a first multipoint data conference participant.

21. The method of claim 20, further comprising the step of setting up attributes prior to said step of admitting a first multipoint data conference participant.

22. The method of claim 20, further comprising the step of setting up applications prior to said step of admitting a first multipoint data conference participant.

23. The method of claim 20, further comprising the step of setting up files to be shared prior to said step of admitting a first multipoint data conference participant.

24. The method of claim 19, further comprising the steps of:

dismissing all other conference participants from the application program share session; and

maintaining the application program share session after all other conference participants have been dismissed.

25. The method of claim 18, further comprising the steps of:

admitting a conference participant to join the application program share session;

receiving a request from the conference participant to assume control of the application program; and

denying control of the application program to the conference participant.

26. The method of claim 18, further comprising the steps of:

admitting a conference participant to join the application program share session;

receiving a request from the conference participant to assume control of the application program; and

granting control of the application program to the conference participant.

27. The method of claim 26, further comprising the steps of:

receiving application program control inputs from the conference participant controlling the application program; and

periodically broadcasting control input updates to the application program.

28. The method of claim 27, wherein said step of receiving application program control inputs includes the step of communicating on a per-host basis with the conference participant controlling the application.

29. The method of claim 18, further comprising the steps of:

admitting a conference participant to join the application program share session;

transmitting a request to the conference participant to assume control of the application program; and

receiving a denial to assume control of the application program from the conference participant.

30. The method of claim 18, further comprising the steps of:

admitting a conference participant to join the application program share session;

transmitting a request to the conference participant to assume control of the application program;

receiving a acceptance to assume control of the application program from the conference participant; and

allowing the conference participant to control the application program.

31. The method of claim 30, further comprising the steps of:

receiving application program control inputs from the conference participant controlling the application program; and

periodically broadcasting control input updates to the application program.

32. The method of claim 31, wherein said step of receiving application program control inputs includes the step of communicating on a per-host basis with the conference participant controlling the application.

33. A method of controlling a shared application in a multipoint data conference having a host and at least one conference participant, comprising the steps of:

sharing an application program; and

indicating a willingness to have the application program controlled by conference participants.

34. The method of claim 33, further comprising the steps of:

receiving a request from a conference participant to assume control of the application program; and

denying control of the application program to the conference participant.

35. The method of claim 33, further comprising the steps of:

receiving a request from a conference participant to assume control of the application program; and

allowing control of the application program to the conference participant.

36. The method of claim 35, further comprising the steps of:

receiving application program control inputs from the conference participant controlling the application program; and

periodically broadcasting control input updates to the application program.

37. The method of claim 36, wherein said step of receiving application program control inputs includes the step of communicating on a per-host basis with the conference participant controlling the application.

38. The method of claim 35, further comprising the step of bouncing control of the application program from the conference participant.

39. The method of claim 35, further comprising the step of pausing control of the application program by the conference participant.

40. The method of claim 35, further comprising the steps of:

receiving a request from the conference participant controlling the application program to pass control to another conference participant; and

denying the request to pass control.

41. The method of claim 35, further comprising the steps of:

receiving a request from the conference participant controlling the application program to pass control to another conference participant; and

approving the request to pass control.

42. The method of claim 33, further comprising the steps of:

transmitting a request to a conference participant to assume control of the application program; and

receiving a denial to assume control of the application program from the conference participant.

43. The method of claim 33, further comprising the steps of:

transmitting a request to the conference participant to assume control of the application program;

receiving a acceptance to assume control of the application program from the conference participant; and

allowing the conference participant to control the application program.

44. The method of claim 43, further comprising the steps of:

receiving application program control inputs from the conference participant controlling the application program; and

periodically broadcasting control input updates to the application program.

45. The method of claim 44, wherein said step of receiving application program control inputs includes the step of communicating on a per-host basis with the conference participant controlling the application.

46. The method of claim 33, further comprising the steps of:

receiving a request to assume control of the application program; and

automatically denying the request after a period of time.

47. The method of claim 33, further comprising the steps of:

receiving a request to assume control of the application program; and

having the request canceled by the conference participant.

48. The method of claim 33, further comprising the steps of:

receiving a first request to assume control of the application program;

receiving a second request to assume control of the application program; and

automatically denying the second request.

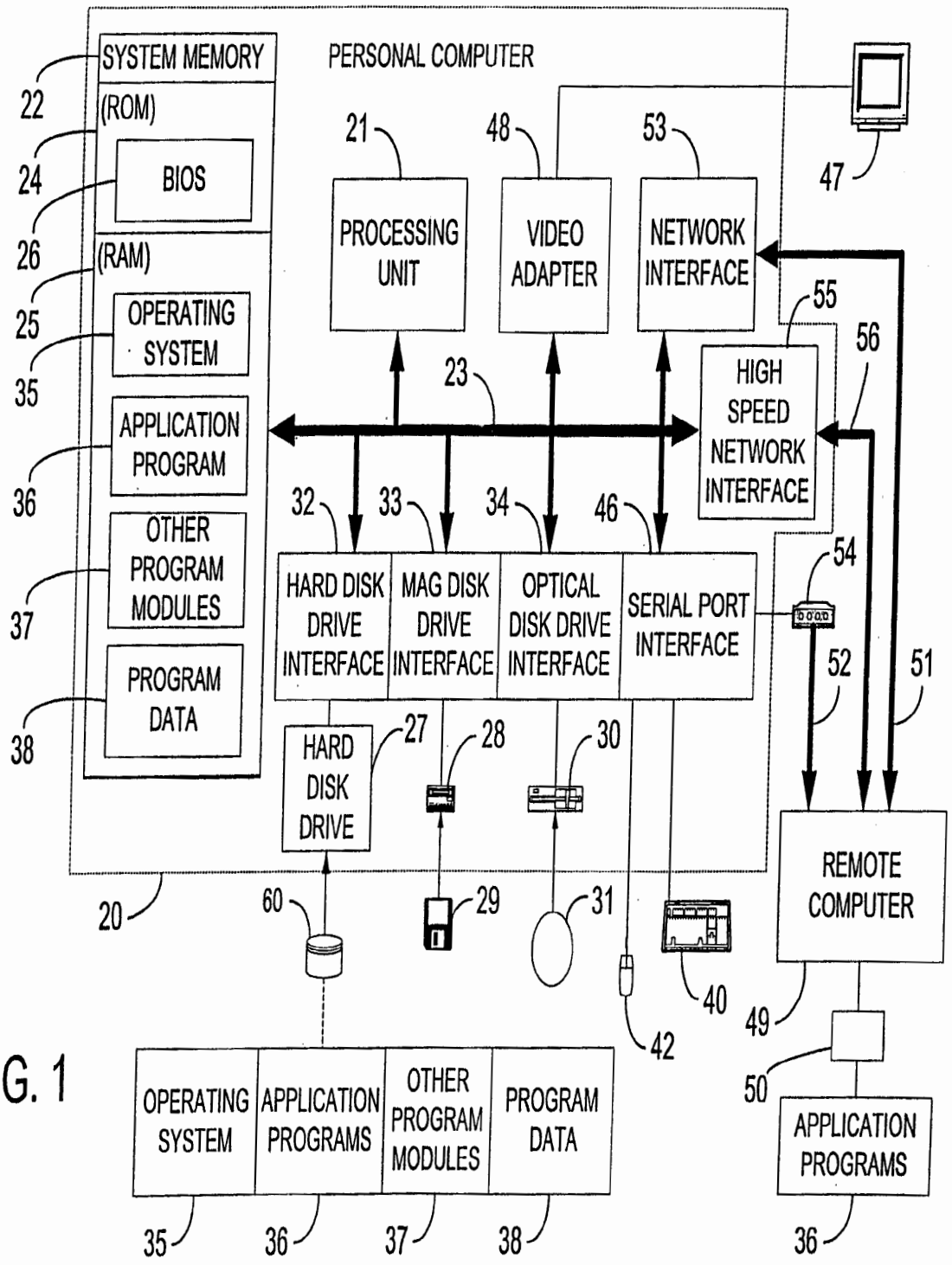

PERSONAL COMPUTER
SYSTEM MEMORY
(ROM)
BIOS
(RAM)
OPERATING SYSTEM
APPLICATION PROGRAM
OTHER PROGRAM MODULES
PROGRAM DATA
PROCESSING UNIT
VIDEO ADAPTER
NETWORK INTERFACE
HIGH SPEED NETWORK INTERFACE
HARD DISK DRIVE INTERFACE
MAG DISK DRIVE INTERFACE
OPTICAL DISK DRIVE INTERFACE
SERIAL PORT INTERFACE
HARD DISK DRIVE
REMOTE COMPUTER
APPLICATION PROGRAMS
OPERATING SYSTEM
APPLICATION PROGRAMS
OTHER PROGRAM MODULES
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FIG. 1

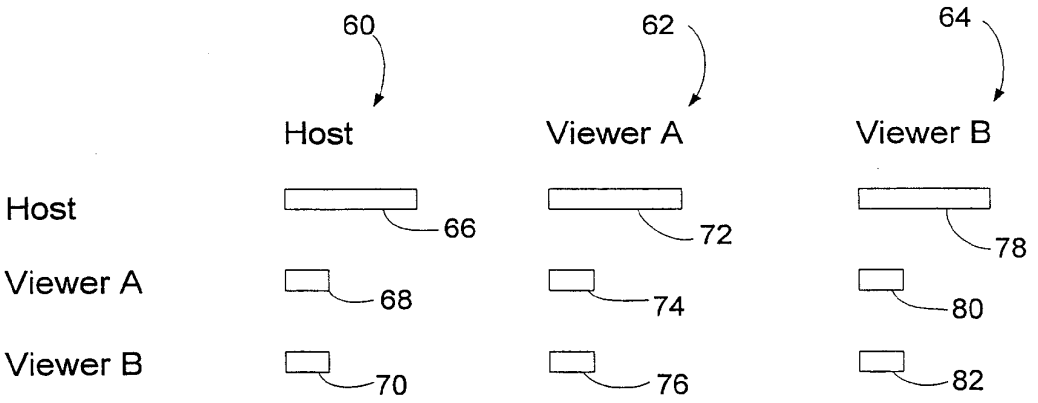


Fig. 2A

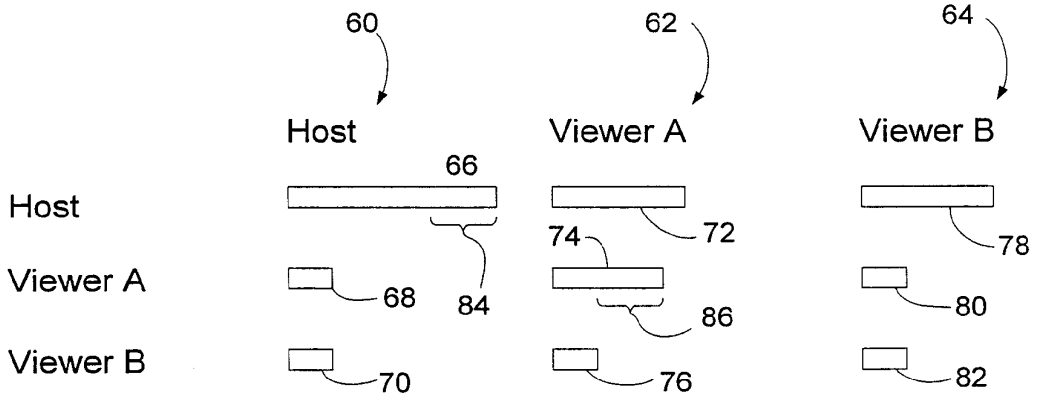


Fig. 2B

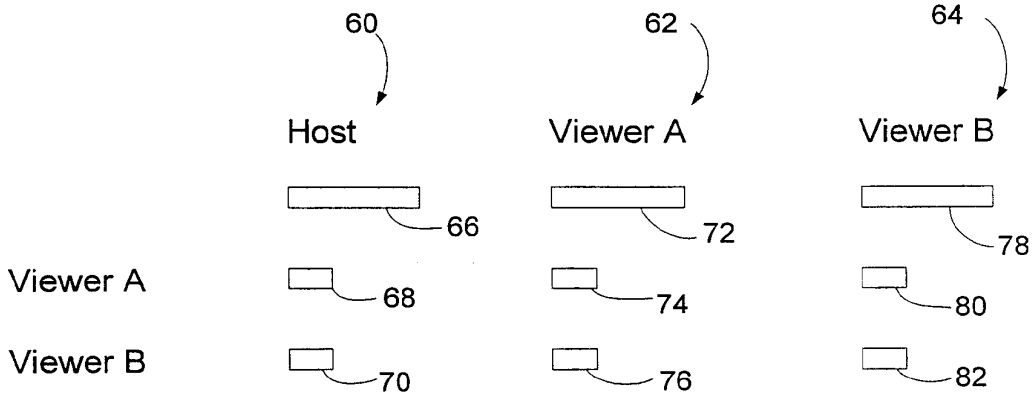


Fig. 2C

SUBSTITUTE SHEET (RULE 26)

INTERNATIONAL SEARCH REPORT

Inte. onal Application No
PCT/US 00/01198

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L12/18 H04M3/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 812 534 A (ARIMILLI HARINARAYANA ET AL) 22 September 1998 (1998-09-22) abstract column 1, line 50 -column 2, line 67 ---	1,18,33
A	US 5 471 318 A (ARAVAMUDAN MURALI ET AL) 28 November 1995 (1995-11-28) abstract claims 1,2 figures 5,6 ---	1,18,33
A	DE 38 18 087 A (SIEMENS AG) 7 December 1989 (1989-12-07) abstract column 1, line 45 -column 2, line 29 ---	1,18,33

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 August 2000	17/08/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Poggio, F

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/US 00/01198

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	OHMORI T ET AL: "COOPERATIVE CONTROL FOR SHARING APPLICATIONS BASED ON DISTRIBUTED MULTIPARTY DESKTOP CONFERENCING SYSTEM: MERMAID" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON COMMUNICATIONS,US,NEW YORK, IEEE, vol. -, 14 June 1992 (1992-06-14), pages 1069-1075, XP000326831 ISBN: 0-7803-0599-X the whole document	1,18,33

1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter onal Application No
PCT/US 00/01198

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5812534 A	22-09-1998	US 5452289 A	19-09-1995
		WO 9615601 A	23-05-1996
		CA 2104701 A	09-07-1994
		EP 0630141 A	21-12-1994
		JP 9238200 A	09-09-1997
		US 5535204 A	09-07-1996
		US 5453986 A	26-09-1995
		US 5617423 A	01-04-1997
		US 5471470 A	28-11-1995
		US 5574725 A	12-11-1996
		US 5673268 A	30-09-1997
		US 5592586 A	07-01-1997
		US 5500859 A	19-03-1996
		US 5559793 A	24-09-1996
		US 6009082 A	28-12-1999
		US 5546395 A	13-08-1996
		US 5619508 A	08-04-1997
		US 5673257 A	30-09-1997
		US 5577041 A	19-11-1996
		US 5600649 A	04-02-1997
		US 5790532 A	04-08-1998
		US 5815503 A	29-09-1998
		US 5764627 A	09-06-1998
		US 5754589 A	19-05-1998
		US 5764628 A	09-06-1998
		US 5864560 A	26-01-1999
US 5471318 A	28-11-1995	AU 679995 B	17-07-1997
		AU 6815594 A	08-11-1994
		BR 9406356 A	02-01-1996
		CA 2160895 A	27-10-1994
		CN 1121758 A	01-05-1996
		EP 0698328 A	28-02-1996
		JP 3032014 B	10-04-2000
		JP 8511917 T	10-12-1996
		NZ 266588 A	29-01-1997
		WO 9424807 A	27-10-1994
DE 3818087 A	07-12-1989	NONE	

Form PCT/ISA/210 (patent family annex) (July 1992)

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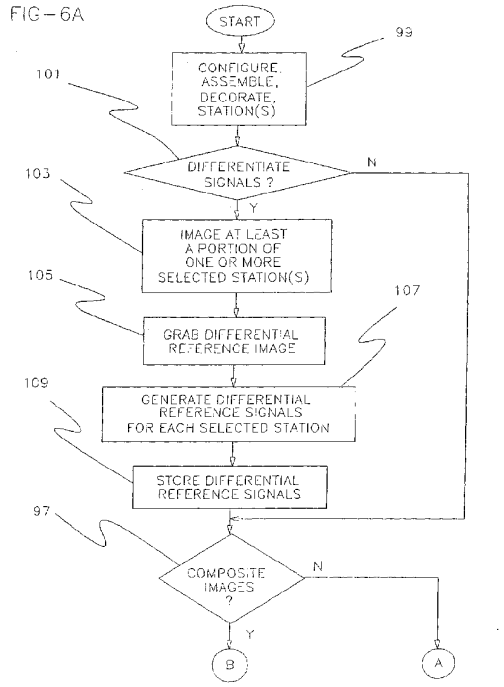
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(54) Teleconferencing method and system

(57) A method and system (10) provides a face-to-face video conference utilizing a video mirror comprising a first station (12) having a first predetermined sensory setting; at least a second station (14) having a second sensory setting; the second station being remote from the first station; and an imaging system for capturing an image or sub-image at the first station, displaying at least a portion of said image or sub-image at the first station. The imaging system includes a differentiator for generating a differential signal (101) in response to a comparison of a differential referecnce signal to an input signal generally corresponding to the image captured at the first station. The imaging system also include a compositor for compositing the differential signal with one or more other image signals and/or a predetermined composite signal to provide a composited video image (97) which appears visually contiguous and seamless.

FIG-6A

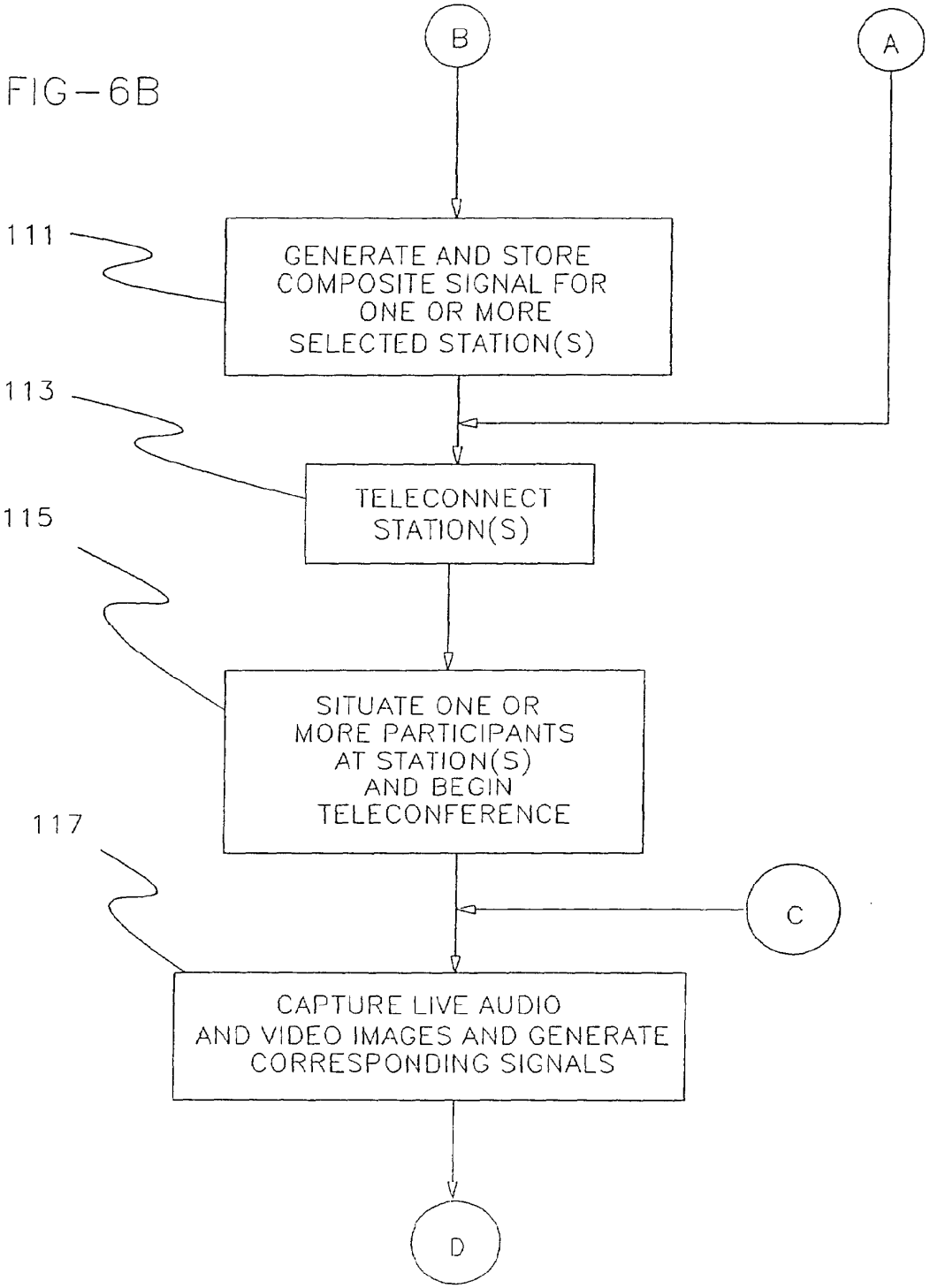


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(Cont. next page)

FIG-6B


B
A
111
GENERATE AND STORE COMPOSITE SIGNAL FOR ONE OR MORE SELECTED STATION(S)
113
TELECONNECT STATION(S)
115
SITUATE ONE OR MORE PARTICIPANTS AT STATION(S) AND BEGIN TELECONFERENCE
117
C
CAPTURE LIVE AUDIO AND VIDEO IMAGES AND GENERATE CORRESPONDING SIGNALS
D

Description

Background of the Invention

[0001] The present invention is related to a video conferencing system and method and, more particularly, to a teleconferencing system which is capable of producing a "video mirror" at a station such that any participants at one or more remote stations may be imaged and displayed in the video mirror at the station so that they appear to be present or face-to-face with any participants at the station.

[0002] Visual telephone systems presently provide communication between at least two locations for allowing a video conference among participants situated at each station. An objective in some video conferencing arrangements is to provide a plurality of television cameras at one location. The outputs of those cameras are transmitted along with audio signals to a corresponding plurality of television monitors at a second location such that the participants at the first location are perceived to be present or face-to-face with participants at the second location. In achieving good face-to-face presence, the number of conferees included in the video picture from each camera is normally limited to a few people, typically one to four. There are usually a like number of monitors at the receiving station, each strategically focused, aligned and positioned so that their displays appear contiguous, seamless and properly aligned. The apparatuses and methods employed heretofore to achieve proper positioning, focus and alignment have been complex and costly.

[0003] Further, the images captured by the plurality of cameras must be arranged and displayed so that they generate a non-overlapping and/or contiguous field of view, for example, as described in U. S. Patent No. 4,890,314 which issued to Judd et al. on December 26, 1989 and which is hereby incorporated by reference and made a part hereof.

[0004] The prior art systems have also been deficient because they have failed to provide means for generating an image, such as an image of a plurality of participants, at one station, differentiating the image to provide a differentiated image and subsequently compositing the differentiated image with a predetermined composite image to provide a composited image which complements or becomes visually complementary, contiguous or integrated with the remote station when the image is displayed at the remote station.

[0005] Another problem with prior art video conferencing systems is eye contact among participants at the stations. Typically, a camera is placed somewhere above the display monitor at which a participant is observing a display of the participant from the remote station. Consequently, the camera captures the participant at an angle above the participants viewing level or head. Thus, when an image of that participant is displayed at the remote station, it appears as if the participant is looking down (e.g., towards the ground). Previous solutions to this problem have required complex optical systems and methods using, for example, a plurality of lenses and mirrors. The solutions have usually been designed for use when the camera is capturing an image of a single participant, and they fall short when simultaneously capturing images of multiple participants.

[0006] The prior art stations themselves were not architecturally designed in a modular form so that they could be easily assembled, decorated and combined with a video image or sub-image from the remote station in a manner which would enhance the virtual presence environment.

Summary of the Invention

[0007] It is, therefore, a primary object of the present invention to provide a face-to-face teleconferencing system which enables a plurality of participants at a plurality of stations to teleconference such that the participants generally appear face-to-face with one or more participants at remote stations in the teleconferencing system.

[0008] Another object of this invention is to provide a differentiator or differentiating means which facilitates differentiating at least one image captured at a station into a differentiated image which will ultimately be transmitted to at least one remote station.

[0009] Another object of this invention is to provide a method and system for compositing an image or sub-image received from a remote station with a predetermined composite image to provide a composited image, at least a portion of which is displayed at the station.

[0010] Still another object of the invention is to provide a system or method which provides a display having wide aspect ratio while utilizing cameras which generate images having smaller aspect ratios.

[0011] Still another object of the invention is to provide a method and system for defining a predetermined sensory setting at one or more stations in order to enhance the virtual presence environment at that station.

[0012] Still another object of the present invention is to provide a method and apparatus for imaging subjects at one station, processing such images, and displaying such images at a remote station such that such images complement and become and/or become visually integrated with the remote station.

[0013] Another object of this invention is to provide a method and apparatus which is capable of generating a composite image having a plurality of different resolutions.

[0014] Still another object of the present invention is to provide a "video mirror" at a station.

[0015] Yet another object of the invention is to provide an imaging system which provides a simplified means capturing substantially eye level images of participants at stations while also providing means for simultaneously displaying images at such stations.

[0016] Still another object of this invention is to pro-

vide a system and method for compositing a plurality of signals corresponding to a plurality of images from at least one station to provide a contiguous or seamless composite image.

[0017] Still another object is to provide a method and system for providing a plurality of teleconferencing stations that have complementary predetermined sensory settings which facilitate creating a face-to-face environment when images of such settings and participants are displayed at remote stations.

[0018] Another object of the invention is to provide a method and apparatus for generating a video mirror such that an image having a predetermined sensory setting of participants or subjects captured at one station may be displayed at a remote station having a different predetermined sensory setting, yet the remote participants will appear face-to-face in the same predetermined setting as the participants or subjects at the one station.

[0019] In one aspect, this invention comprises an image generator for use in a teleconferencing system comprising a differentiator for comparing a differential reference image to an input video image from a station and for generating a differential image in response thereto, and a compositor associated with a remote station for receiving the differential image and for combining that differential image with a predetermined composite image to provide a composite image.

[0020] In another aspect, this invention comprises a conferencing system comprising a first station comprising a first sensory area defining a first aura, a second station comprising a second sensory area defining a second aura, and an image system for generating a first station image of at least a portion of the first sensory area and also for displaying a composite image corresponding to the first station image at the second station such that the first and second auras become visually combined to provide an integrated face-to-face environment at the second station.

[0021] In another aspect, this invention comprises an image system for use in a conference environment comprising a station having a first conference area and a remote station having a remote video area, the image system comprising a compositor for compositing a first signal which generally corresponds to a video image of a portion of the first conference area with a composite reference signal to provide a composite image signal; and a display for displaying the composited image signal at the remote video area such that the first and second stations appear complementarily integrated.

[0022] In still another aspect of the invention, this invention comprises a teleconferencing system comprising a sensory setting, a second station having a second predetermined sensory setting; and an imaging system for capturing an image at the first station and displaying at least a portion of the image at the second station such that it becomes generally visually integrated with the second predetermined sensory setting.

[0023] In another aspect of this invention, this invention comprises a station for use in a teleconferencing environment comprising a first station predetermined setting, first image sensing means associated with the first station predetermined setting for capturing images at the station for transmission to a remote station, audio means for transmitting and/or receiving audio signals from at least one remote station, and display means for displaying an image including at least one sub-image transmitted to the station from the remote station so that the image becomes integrated with the first station predetermined setting to facilitate providing a face-to-face presence teleconference.

[0024] In still another aspect of the invention, this invention comprises a method for providing a virtual presence conference in a teleconferencing system having a first station and a second station comprising the step of displaying an image formed from at least one sub-image from the first station at a predetermined location in the second station such that the image becomes visually integrated with the second station to define a single predetermined aura at the second station.

[0025] In yet another aspect of the invention, this invention comprises a method for teleconferencing comprising the steps of teleconnecting a first station having a first setting to a second station having a second setting; and displaying a composite image including an image of at least a portion of the first station at the second station such that when the composite image is displayed at the second station it cooperates with the second setting to facilitate providing a face-to-face environment at the second station.

[0026] In still another aspect, this invention comprises a method for teleconferencing comprising generating at least one first station signal generally corresponding to a first station image of the first station, comparing the at least one first station signal to a differential reference signal corresponding to a first reference image and generating at least one differential signal comprising a portion of the first station image in response thereto, compositing the at least one differential signal with a predetermined composite signal corresponding to a predetermined image to provide at least one composite image, and displaying the at least one composite image corresponding to the composite signal at a second station.

[0027] In yet another aspect, this invention comprises a method for generating a seamless image at a station from a plurality of sub-images at least one of which is received from a remote station comprising the steps of generating the plurality of sub-images, and combining the plurality of sub-images with a predetermined composite image to provide the seamless image.

[0028] These advantages and objects, and others, may be more readily understood in connection with the following specification, claims and drawings.

Brief Description of the Accompanying Drawings

[0029] Figs. 1A and 1B, taken together, show a teleconferencing system according to one embodiment of this invention;

[0030] Fig. 2 is a partly broken away top view of a first station of the teleconferencing system shown in Fig. 1A;

[0031] Figs. 3A and 3B, taken together, show another embodiment of the present invention wherein the stations have different predetermined sensory settings;

[0032] Figs. 4A and 4B, taken together, show still another embodiment of the invention having stations which have predetermined sensory settings which are designed, decorated and defined to be complementary and/or substantially identical;

[0033] Figs. 5A and 5B, taken together, provide a visual illustration of the images corresponding to some of the signals generated by the teleconferencing system; and

[0034] Figs. 6A-6D, taken together, show a schematic diagram of a method according to an embodiment of this invention.

Detailed Description of Preferred Embodiment

[0035] Referring now to Figs. 1A and 1B, a teleconferencing system 10 is shown having a first station or suite 12 and a second station or suite 14. The first station 12 comprises a first conference or sensory area 16, and the second station 14 comprises a second conference or sensory area 18-1, respectively. The first and second stations 12 and 14 also comprise a first video area 20 and a second video area 22-1, respectively, associated with the first and second conference areas 16 and 18-1. The first video area 20 is generally integral with a wall 32h in the first station 12. Likewise, the second video area 22-1 is generally integral with a wall 32h-1 in the second station 14. In the embodiment being described, the first and second stations are geographically remote from each other, but they could be situated on the same premises if desired.

[0036] For ease of illustration, the construction and modular assembly of the stations in teleconferencing system 10 will be described in relation to the first station 12. As shown in the sectional top view of Fig. 2, the first station 12 is shown assembled or constructed into a generally elongated octagonal shape. The first station 12 comprises a plurality of modular members 32a-32h which include walls 32a, 32c-e, 32g-h, doors in wall members 32b and 32f and entry facade 32f-1. The first station 12 also comprises a ceiling 34 (Fig. 1A) which is mounted on the members 32a-32h with suitable fasteners, such as nuts, bolts, adhesives, brackets, or any other suitable fastening means. Notice that the ceiling 34 has a dropped or sunken portion 34a which supports appropriate lighting fixtures 56.

[0037] In the embodiment being described, each of the members 32a-32h and the ceiling 34 is molded or formed to provide or define an environment having a unique architectural setting and/or sensory setting. For example, as illustrated in Fig. 1A, the wall member 32a may be formed to provide a plurality of stones 36, a plurality of columns 38, and an arch 40 to facilitate defining a first predetermined setting 12a having a Roman/Italian motif, theme or aura. One or more of the members 32a-32h may be provided with inlays, wall decorations (like picture 58 in Figs. 1A and 2), or even a permanent frosted glass window and frame arrangement 42 mounted therein. Furthermore, members 32b and 32f (Fig. 2) may be provided with sliding doors 44 which facilitate entering and exiting the first station 12 and which are designed to complement or further enhance the Roman/Italian motif.

[0038] In the embodiment being described, notice that member 32h (Figs. 1A and 2) is formed to provide a stone and pillar appearance and texture complementary to the stone and pillar appearance and texture of the wall members, such as member 32a. Also, the member 32a may be shaped to frame or mask a rear projection screen 46, as shown. The function and operation of the rear projection screen 46 will be described later herein. In the embodiment being described, the rear projection screen 46 comprises a high resolution lenticular rear projection screen which is either integral with or mounted directly to member 32h to provide a first video area 20 having a usable projection area of about 52 inches by 92 inches (1,32m×2,34m) with an associated aspect ratio of 16:9.

[0039] Each of the members 32a-32h and ceiling 34 are created in separate modular units using a plurality of molds (not shown). In the embodiment being described, a suitable material for molding the members 32a-32h and ceiling 34 to provide a granite-like appearance may be Gypsum, but they could be formed from other suitable material such as stone or clay-based materials, ceramic, paper, cardboard, foam, wood, Styrofoam and the like. As illustrated in 1A and 2, the member 32d may be provided with a shelf or mantle 33. The various members 32a-32h are assembled together as shown in Fig. 2 and secured together with suitable support braces 48 which may be secured to the walls 32a-32h with any suitable fastener such as screws, bolts, an adhesive or the like. After the first station 12 is assembled and the ceiling 34 is secured thereto, it has a length of about 14 feet, 6 inches (4,42m) (indicated by double arrow L in Fig. 2) and a width of about 12 feet, 0 inches (3,66m) (indicated by double arrow W in Fig. 2). The first station 12 has an approximate height from floor to ceiling 34 of about 8 feet, 6 inches (2,59m). Further, the members 32a, 32c, 32e and 32g have a width (indicated by double arrow Y in Fig. 2) of about 5 feet, 0 inch (1,52m). Finally, the back wall member 32d and front wall member 32h comprises a width of about 7 feet, 8 inches (2,33m) (indicated by double arrow X in Fig. 2).

[0040] After the members 32a-32h and ceiling 34 are assembled, the first station 12 may be further decorated,

designed or ornamented with a plurality of subjects, decorations or ornaments which facilitate providing the first predetermined sensory setting 12a which defines a first aura, motif or theme. Likewise, the second station 14 maybe further provided or ornamented with a plurality of subjects, decorations or ornaments which facilitate providing a second predetermined sensory setting 14a which defines a second aura, motif or theme. For example, as illustrated in Fig. 1A, the predetermined sensory setting 12a of the first station 12 may be further decorated with a table 50, table decorations, pillar and wall decorations, carpet (not shown), plants 54 and other wall decorations (not shown) to further enhance the Roman/Italian motif, theme or aura. The first and second predetermined sensory settings 12a and 14a may also comprise appropriate lighting fixtures 56 and appropriate furnishings, such as chairs 60 and tables 61, which complement the predetermined setting to further facilitate defining the Roman/Italian theme or motif for the stations 12 and 14.

[0041] It should be appreciated that once the first and second stations 12 and 14 are assembled and ornamented or decorated to provide their respective first and second predetermined sensory settings 12a and 14a, they define an aura, theme or motif which facilitates providing or creating a very sensual and impressionable environment. Providing such a station, such as station 12, with a strong sensory environment facilitates enhancing the virtual presence illusion created by teleconferencing system 10 of the present invention.

[0042] It should also be appreciated, however, that although the first station 12 and second station 14 are shown in the embodiment in Figs. 1A and 1B as having complementary or similar first and second predetermined sensory settings 12a and 14a, they could be provided with first and second predetermined sensory settings 12a and 14a having different themes, motifs or auras. Thus, while the embodiment described in relation to Figs. 1A and 1B illustrate a first and second set of stations 12 and 14 having a Roman/Italian motif, another set of stations, such as station 12' and station 14' in the embodiment illustrated in Figs. 3A and 3B, may have at least one station having a different predetermined setting. For example, the second station 14' in Fig. 3B provides a setting 14a' which defines a Chinese aura, theme or motif.

[0043] It should also be appreciated that the members 32a-32h, ceiling 34 and associated predetermined sensory setting are provided to be transportable and capable of being assembled at any suitable location, such as an existing rectangular room, suite or conference area having dimensions of at least 20 feet x 20 feet x 9 feet. (6,10m×6,10m×2,74m). While it may be desirable to provide the first and second stations 12 and 14 in the teleconferencing system 10 with substantially the same dimensions, it should be appreciated that they could be provided with differing dimensions, depending on, for example, the number of participants at each station. It should also be appreciated that the second station 14 and other stations described herein would preferably be manufactured and assembled in the same or similar manner as the first station 12. Also, the stations in the teleconference system 10 may be decorated with wall, ceiling and floor coverings to provide, for example, the first predetermined sensory setting 12a without using the preformed or molded modular members 32a-32h described above, although the use of such members may be preferable in this embodiment.

[0044] The teleconferencing system 10 also comprises conferencing means or a conferencing system means for teleconnecting the first and second stations 12 and 14 together to facilitate capturing an image or images at one of said stations and displaying at least a portion of the image or a sub-image at another of the stations such that it becomes generally visually integrated with the predetermined sensory setting at that station, thereby facilitating creating a "video mirror" and a "face-to-face" environment for the participant situated at that station. As shown in Fig. 1a, the conferencing system associated with the first station 12 comprises image sensor means, imager or image sensors for sensing images at the first station 12. For the embodiment shown in Figs. 1A and 2, the image sensor means comprises a plurality of cameras which are operably associated with the rear projection screen 46 of first station 12. In this regard, the plurality of cameras comprise a first camera head 62 and second camera head 64 which are operatively coupled to a first camera control unit 66 and second camera control unit 68, respectively. Notice that the first and second camera control units 66 and 68 are remotely situated from the first and second camera heads 62 and 64. This facilitates permitting the first and second cameras 62 and 64 to be placed directly in the projection path of the rear projection screen 46, without substantially interfering with the video image being projected.

[0045] In the embodiment being described, the first camera head 62 and second camera head 64 are situated approximately 16 inches (40,6cm) above he surface of table 50 which generally corresponds to the eye level of the seated participants situated at table 50. As illustrated in Fig. 2, the first and second cameras 62 and 64 are situated behind the rear projection screen 46 in operative relationship with a pair of 1-1/4 inch (31,8mm) diameter openings 66 and 68, respectively. The first and second cameras 62 and 64 are mounted on a suitable narrow or non-interfering bracket (not shown) such that they can be positioned behind the rear projection screen 46 in operative relationship with openings 66 and 68, respectively. In the embodiment being described, the first and second cameras 62 and 64 are 1-1/4 inch by 1-1/4 inch (31,8×31,8mm) 3-CCD camera heads which generate images having an aspect ratio of about 3:4 and a picture resolution of about 494 x 700 pixels. One suitable 3-CCD camera heads 62 and 64 and associated camera control units 66 and 68 may be Model No.

GP-US502 manufactured by Panasonic Broadcast and Television Systems Company of Japan. It should be appreciated that while the teleconferencing system 10 shown and described in relation to Figs. 1A and 1B show image sensor means comprising a plurality of camera heads 62 and 64 and camera control units 66 and 68 situated at a station, a single camera may be used (as shown and described relative to the embodiment shown in Figs, 4A and 4B) or even multiple cameras could be used depending on such things as the size of the station, the number of participants situated at the station, and/or the aspect ratio of each camera head selected. It should also be appreciated that the camera heads 62 and 64 and associated camera control units 66 and 68 are configured and positioned at the first station 12 to facilitate providing maximum vertical eye contact among participates in the teleconference, while minimally interrupting the substantially life-size video projection on the rear projection screen 46.

[0046] The conferencing means also comprises a first differentiator or differential key generator 70 (Fig. 1A) and a second differentiator or differential key generator 72, respectively. The camera control unit 66 generates an RGB analog signal I-62 which is received by the first differentiator 70, and the camera control unit 68 generates an RGB signal I-64 which is received by the second differentiator 72. The first and second differentiators 70 and 72 provide means for processing the image signals generated by the camera control units 66 and 68 to remove or differentiate any undesired portion of the images corresponding to the signals I-62 and I-64. For example, as described in detail later herein, it is desired in this embodiment to separate the image of the participants situated at the first station 12 from at least a portion of the first predetermined sensory setting 12a, such as the background behind the participants, in order to provide a differential signal VS-1 that has that portion of the first predetermined sensory setting 12A removed. This, in turn, facilitates transmitting the video image of the participants at the first station 12 to the remote second station 14 and also facilitates compositing the image with other images, as described below.

[0047] Suitable differentiators 70 and 72 may comprise the differential key generator shown and described in U.S. Patent No. 4,800,432, issued on January 24, 1989 to Barnett et al. and assigned to The Grass Valley Group, Inc., which is incorporated herein by reference and made a part hereof.

[0048] The differential key generators 70 and 72 convert the I-62 and I-64 signals from RGB analog signals to digital image signals having corresponding images 104 and 106 (Fig. 5A), respectively. The differential key generators 70 and 72 compare the digital image signals to an associated differential reference signals DRS-62 and DRS-64, respectively, which generally corresponds to images 108 and 110 in Fig. 5A. As described in detail later herein, these images 108 and 110 comprise at least a portion of the first predetermined sensory setting 12a such as the background. The differential reference signals DRS-62 and DRS-64 are stored in appropriate storage 74 and 76 (Fig. 1A) associated with the differential key generators 70, 72, respectively. In the embodiment being described, the differential reference signals DRS-62 and DRS-64 comprise a reference frame of a video image grabbed by one or both cameras 62 or 64 situated at the first station 12 from a video sequence of the first predetermined sensory setting 12a of the first station 12 background where no participants, chairs, or other foreground elements are in place.

[0049] In response to the comparison, the first and second differentiators 70 and 72 generate differentiated video signals VS-1 and VS-2 (Fig. 1A), respectively. As illustrated in Fig. 5, the VS-1 and VS-2 signals generally correspond to the individuals situated at the first station 12 when viewed in the direction of arrow A in Fig. 2. As illustrated in the images 112 and 114 (Fig. 5) associated with the VS-1 and VS-2 signals, respectively, notice that the background area shown in images 104 and 106 has been removed and is tagged as a "zero" image area.

[0050] Advantageously, tagging at least a portion of the image represented by the VS-1 signal as "zero" background facilitates compressing the VS-1 and VS-2 signals and providing corresponding compressed CDS-1 and CDS-2 signals, thereby reducing the amount of transmission band width needed. This tagging also facilitates compositing or overlaying another predetermined image to provide a seamless composited image as described in detail below.

[0051] The video signals VS-1 and VS-2 are received by a first compression/decompression means or CODEC 78 and a second compression/decompression means or CODEC 80, respectively. The CODECs 78 and 80 also receive an audio signal AS-A1 and AS-A2 from suitable microphones 82 and 83, respectively, which may be positioned or concealed at an appropriate location in the first station 12, such as underneath or on top of table 50, as illustrated in Fig. 1A. The function of the first and second CODEC 78 and 80 is to compress video and audio signals for transmitting to remote stations, such as the second station 14, and also to decompress compressed video and audio signals received from remote stations. Consequently, the CODECs 78 and 80 are configured with suitable compression and decompression algorithms which are known to those of ordinary skill in the art. The CODEC Model No. Rembrandt II VP available from Compression Labs, Inc. of San Jose, California is suitable for use in the embodiment described herein, but it should be noted that other suitable compression/decompression means may be employed.

[0052] The CODEC 78 receives the video signal VS-1 and audio signal AS-A1, and CODEC 80 receives the video signal VS-2 and audio signal AS-A2. The CODECs 78 and 80, generate digital signals CDS-1 and CDS-2, respectively, in response thereto which are in turn transmitted to remote station 14 via a transmission

network 84.

[0053] The transmission network 84 may be configured as a private network, public circuit switch service, and it may utilize telecommunication and/or satellite technology. In the embodiment being described, the transmission network 84 preferably includes a plurality of T-1 lines (not shown) which are capable of accommodating bit streams having a suitable band width, such as 1.544 megabytes per second.

[0054] The teleconferencing system 10 and conference means associated with the first station 12 also comprises enhancing means for enhancing the resolution of an image or sub-image received from a remote station, such as the second station 14. In the embodiment being described, enhancing means comprises a first line doubler 86 and a second line doubler 88 which are operatively coupled to the first CODEC 78 and second CODEC 80, respectively. In this embodiment, the first and second line doublers 86 and 88 enhance the resolution and picture quality of at least a portion of the image corresponding to video signals VS-3 and VS-4 received from the CODECs 78 and 80, respectively, by about 50-150%. The VS-3 and VS-4 signals correspond to images or sub-images received from remote station (s), such as station 14, as described in detail below. One suitable line doubler is the Model No. LD 100 available from Faroudja Laboratories, Inc. of Sunnyvale, California, but other suitable enhancing means may be provided to provide greater or less enhancement of the images to be displayed. For example, lenses, mirrors, optical pixel interpolation or other electrical means may be employed as desired. It should also be noted that the present invention may be performed without the use of any enhancing means without departing from the scope of the invention.

[0055] The first and second line doublers 86 and 88 generate enhanced video signals which are input into compositing means, compositor or video compositing multiplexer 92 for compositing the enhanced video signals associated with the images or sub-images received from the remote station(s) with one or more predetermined composite signals, such as predetermined composite signal A, corresponding to a predetermined composite image or sub-image which are stored in a suitable storage device 94 associated with the compositor 92. In the embodiment being described, the predetermined composite signal A corresponds to an image of at least a portion of first predetermined sensory setting 12a, such as the background of the first station 12. The video compositing multiplexer 92 composites the signals received from the first and second line doublers 86 and 88 with the predetermined composite signal A and generates a RGB analog composite signal in response thereto. It has been found that Model No. E-Space-1 available from Miranda Technologies, Inc. of Montreal and Quebec, Canada, is one suitable video compositing multiplexer 92.

[0056] The teleconferencing system 10 comprises a projector 96 coupled to the video compositing multiplexer 92 which receives the RGB composite signal and projects a corresponding image 90 (Fig. 1A) corresponding to the composite signal on the rear projection screen 46. The Model No. 3300 available from AMPRO Corporation of Titusville, Florida has been found to be a suitable projector 96. Although the embodiment has been described using projector 96 and rear projection screen 46, other suitable means may be employed for projecting or displaying the composited image. For example, a liquid crystal display (LCD) or other electronic screen may be suitable to display images at a station. This may eliminate the need for the projector 96.

[0057] The projector 96 could be used with an optical system or a plurality of mirrors (not shown), or prisms (not shown) such that the projector can be positioned, for example, to the side or below the rear projection screen 46 or in a manner that permits the projector 96 to project the image towards a mirror (not shown), which causes the image to be projected on the rear projection screen 46.

[0058] As described in detail below, the composite signal and its corresponding image 90 generally comprise a video image of at least a portion of the first predetermined sensory setting 12a combined or composited with a differentiated image, such as an image of the participants from the second station 14 which correspond to the VS-3 and VS-4 (Fig. 1B) signals. Consequently, the resultant image 90 projected on screen 46 at the first station 12 complements or blends with the architectural motif, aura, theme or design defined by the first predetermined sensory setting 12a at the first station 12, such that the projected image 90 appears visually integrated with the first predetermined sensory setting 12a of the first station 12. This, in turn, causes any image of the participants situated at the second station 14 and included in the image 90 to appear to be face-to-face with participants at the first station 12 during the teleconference. The operation of the compositor 92 is described in more detail later herein.

[0059] It should be appreciated that the sub-images or images received from the remote station(s) typically have a resolution on the order of about 352 x 288 pixels and the predetermined composite signal A comprises a resolution on the order of about 1280 x 1024 pixels. Thus, the resultant composite image 90 may comprise, for example, an image of the participants situated at the second station 14 having a first resolution and a background image of the first station 12 having a second resolution, which is higher than the first resolution. This enables compositor 92 to provide a composite image 90 which, when displayed on screen 46, gives the illusion or effect of a "video mirror" to the participants situated at the first station 12.

[0060] The teleconferencing system 10 also includes audio means comprising a plurality of speakers 100 and 102 (Figs. 1A and 2) which, in turn, receive audio signals AS-B1 and AS-B2 from CODECs 78 and 80, respective-

ly. It should be appreciated that the audio signal AS-B1 and AS-B2 generally correspond to the audio associated with the sound (e.g., voices, music and the like) associated with the remote station(s), such as second station 14.

[0061] It should also be appreciated that the rear projection screen 46 and projector 96 are configured and selected to enable the teleconferencing system 10 to project the composited image 90 (Fig.1A) at a predetermined scale, such as substantially full scale. In this regard, the compositor 92 comprises a scaler 95 which is integral therewith for scaling the composited signal associated with the composited image 90 to a desired or predetermined scale, such as substantially full scale.

[0062] Referring now to Fig. 1B, the second station 14 comprises similar components as the first station and such like components are labelled with the same reference numeral as their corresponding component in the first station 12, except that the components associated with the second station 14 have a "-1" designator added thereto. Such components operate and function in substantially the same manner as described above with regard to the first station 12 with the following being some differences. The differential reference signals DRS-3 and DRS-4 (Fig. 5) associated with the second station 14 generally correspond to an image or sub-image of at least a portion of the second predetermined sensory setting 14a, such as the background 98-1, of the second station 14. Such sub-image or image may include at least a portion of the background 98-1 without any participants, chairs or other foreground subjects situated in the second station 14. Also, like the predetermined composite signal A stored in the storage 94 associated with the first station 10, a predetermined composite signal B may be stored in the storage 94-1 associated with the compositor 92-1 second station 14. The predetermined composite signal B may correspond to an image or sub-image of at least a portion of the second predetermined sensory setting 14a of the second station 14. Such sub-image or image may include, for example, an image of the walls 32a-1 to 32h-1 and conference area 18 or background of the second station 14. Notice that in the embodiment shown in Figs. 1A and 1B, the second station 14 has a second predetermined sensory setting 14a which mirrors or is complementary to the first predetermined sensory setting 12a. As described above, however, the first and second predetermined sensory settings 12a and 14a may be different.

[0063] A method of operating the teleconferencing system 10 will now be described in relation to Figs. 6A-6D. The modular components, such as members 32a to 32h and ceiling 34 for first station 10, decorations and the like, are configured, assembled and decorated (block 99 in Fig. 6A) at a desired location to provide a conference station comprising a predetermined sensory setting defining a predetermined theme, motif or aura. As mentioned earlier herein, the theme, motif or aura may be complementary (as shown in Figs. 1A and 1B) or they can be completely different, as shown in Figs. 3A and 3B (described below). For ease of illustration, it will be assumed that the stations are assembled and decorated as shown and described relative to the embodiment in Figs. 1A and 1B.

[0064] Once the modular stations 12 and 14 are assembled and decorated, it may be desired (decision point 101 in Fig. 6A) to use differentiator (e.g., differentiator 72 in Fig. 1A). As discussed herein relative to the embodiments shown in Figs. 4A and 4B, it may not always be desired to generate a differential reference image, thereby making it unnecessary to generate the differential reference signal. If differentiation is desired, then the camera heads 62 or 64 generate at least one video image (block 103) of at least a portion of the first predetermined sensory setting 12A at the first station 12. The differentiators 72 and 74 grab or capture at least one differential reference image or sub-image from those images and generate (block 107) the differential reference signals DRS-62 and DRS-64, respectively. These signals are stored in suitable storage 74 and 76 for use by the differentiators 70 and 72, respectively. Likewise, cameras 62-1 and 64-1 at the second station 14 generate video images of at least a portion of the second predetermined setting 14a at the second station 14. The differentiators 70-1 and 72-1 grab or capture at least one differential reference image or sub-image from those images and generate differential reference signals (not shown) corresponding thereto. These signals are then stored (block 109) in suitable storage 74-1 and 76-1 for use by differential key generators 70-1 and 72-1, respectively.

[0065] As mentioned above, it is preferred that the differential reference signals DRS-62 and DRS-64 comprise an image of at least a portion of the first predetermined sensory setting 12a, such as an image of the first station 12 without any participants, chairs or other subjects which are not stationary during the teleconference. Likewise, it is preferred that the differential reference signals associated with the differentiators 70-1 and 72-1 comprise at least a portion of the second predetermined sensory setting 14a at the second station 14, such as an image of the background 98-1 without the participants, chairs and other subjects which are not stationary during the teleconference.

[0066] If differentiation of signals is not selected or at the end of the differentiation process, it may be desired to generate a composite image (decision point 97) for one or more of the stations. As discussed below, however, this may not always be required to achieve certain advantages of the invention. Such predetermined composite image would preferably include a substantial portion of the first predetermined sensory setting 12a, including the background and/or conference area 16 of the first station 12. If compositing is desired, then the predetermined composite signal A is generated (block 111 in Fig. 6B). The corresponding predetermined composite signal A may then be stored in suitable storage

94. In the same manner, the predetermined composite image at the second station 14 and corresponding predetermined composite signal B may be generated and stored as predetermined composite signal B in suitable storage 94-1. In the embodiment being described, the predetermined composite image associated with the second station 14 includes an image of at least a portion of the second predetermined sensory setting 14a, including the background 98-1.

[0067] In the embodiment being described, the predetermined composite signals A and B are generated by a suitable still camera (not shown) to provide a still image (not shown) of the station 12 or 14 being photographed. The still image would subsequently be scanned and digitized for storage by a suitable scanner (not shown). The still camera and scanner would preferably be capable of generating images having a resolution on the order of about 1280 x 1024 pixels. Thus, if compositing is performed, the resultant composite image (such as image 90 in Fig. 1A) may comprise an image having a high resolution background, for example, combined with a comparatively lower resolution image of the remote station participants. This, in turn, facilitates enhancing the "video mirror" effect wherein a mimic or replication of a common architectural technique of mirroring a wall of a given room which makes the overall room appear to be extended beyond its actual wall line.

[0068] Once the stations 12 and 14 are configured and the differential reference signals and predetermined composite signals A and B are generated and stored, the first and second suites 12 and 14 may then be teleconnected (block 113) or connected by satellite or other suitable means via the transmission network 84.

[0069] Next, one or more participants may be situated at the first and second stations 12 and 14. As illustrated in Fig. 2, notice that the participants seated at the first station 12 are situated a predetermined distance B from a participant's side 46a of the rear projection screen 46. The predetermined distance B generally corresponds to a preferred or optimum focal distance at which optimum imaging by cameras 62 and 64 may be performed. In the embodiment being described, it has been found that the predetermined distance should be about 5 feet, 6 inches (1,67m). The participants are situated at the second station 14 in a similar manner and the face-to-face teleconference may then begin.

[0070] For ease of illustration, the imaging and display of first station 12 participants at the second station 14 will be described. The first and second cameras 62 and 64 capture (block 117 in Fig. 6B) live images of the participants situated at the first station 12 and generate corresponding RGB analog signals I-62 and I-64 which are received by the differential key generators 70 and 72, respectively. If differentiation was selected (decision point 147 in Fig. 6C), processing continues at block 119 otherwise it proceeds at block 123. The differential key generators 70 and 72 generate (block 121 in Fig. 6C) the digital differential signal VS-1 and VS-2, respectively, after comparing (block 119 in Fig. 6C) the I-62 and I-64 signals received from cameras 62 and 64 to their respective differential reference signals DRS 62 and DRS-64 which are received from storages 74 and 76.

[0071] The differential signals VS-1 and VS-2 are then received by CODECs 78 and 80 which also receive the audio signals AS-A1 and AS-A2 which correspond to the audio, including sounds, music and voices, associated with the first station 12. The CODECs 78 and 80 digitize the audio signals AS-A1 and AS-A2, combine the audio signals with their respective video signal VS-1 or VS-2, and generate (block 123) the compressed CDS-1 and CDS-2 signals in response thereto. The CDS-1 and CDS-2 signals are then transmitted (block 125) to the second station 14 via the transmission network 84 (Fig. 1B).

[0072] The CDS-1 and CDS-2 signals are received and decompressed (block 127 in Fig. 6C) by CODECs 78-1 and 80-1, respectively, associated with the second station 14 to provide decompressed VS-1 and VS-2 signals. The CODECs 78-1 and 80-1 also decompress the audio signals AS-A1 and AS-A2 received from the first station 10 which are transmitted to speakers 100-1 and 102-1, respectively, at the second station 14.

[0073] Substantially simultaneously with the broadcasting of the audio signals at the second station 14, CODECs 78-1 and 80-1 decompress the CDS-1 and CDS-2 signals to provide VS-1 and VS-2 signals. The decompressed video signals VS-1 and VS-2 are then received by line doublers 86-1 and 88-1. If it is desired to enhance the signals (decision point 129), then the line doublers 86-1 and 88-1 process or manipulate the signals (block 131) in order to enhance the resolution of the image corresponding to those signals. After the signals VS-1 and VS-2 are processed, it may be desired to composite (decision point 133 in Fig. 6D) those signals with one or more other signals. In this illustration, for example, the video compositor 92-1 composites images (block 135) corresponding to those signals with at least one predetermined composite image, such as image 122 (Fig. 5B) corresponding to the predetermined composite signal B provided from storage 94-1 (Fig. 1B) to provide a composite signal. As mentioned above, the composite signal generally corresponds to the composited image 91-1 to be displayed on the rear projection screen 46-1 at the second station 14.

[0074] The compositor 92-1 may (decision point 137, block 139 in Fig. 6D) scale the composited image to a desired scale, such as full scale, using scaler 95-1. Thereafter, the compositor 95-1 transmits a corresponding RGB analog signal to projector 96-1 which displays (block 141) the scaled, composited image on the rear projection screen 46-1 (Fig. 1B).

[0075] The teleconference may then be continued or terminated as desired (decision point 143, block 145).

[0076] Because the composited image is substantially full scale when projected and includes a high resolution image of at least a portion of the second predeter-

mined sensory setting 14a, the image appears to blend or become visually integrated with the second predetermined sensory setting 14a. This, in turn, gives the participants situated at the second station 14 the perception that the first station participants are present or face-to-face with them in the second station 14.

[0077] In the same or similar manner, images and signals relative to the second station 14 images are captured, processed and displayed at the first station 12. So that images of the participants at the second station 14 are displayed at the first station 12 such that they appear to have a face-to-face presence at the first station 12. Thus, images of the second station 14 participants may be differentiated and composited such that, when they are displayed at the first station 12, the image completes or provides "the other half" of the first station 12 and becomes generally visually integrated therewith. Although not required, it may be desirable to enhance the face-to-face presence by providing, for example, first and second predetermined sensory settings 12a and 14a which define a dining environment wherein food or meals may be served. For example, the face-to-face presence may be further enhanced if the participants at both stations 12 and 14 order food and drinks from identical menus. Also, trained maitre-de and/or waiters may be used to actively promote the perception of a face-to-face dinner using a scripted dialog and interaction with remote participants, maitre-de and/or waiters.

[0078] Once the teleconferencing is terminated, the stations 12 and 14 may be used by the same or different participants without the need to reconstruct or reassemble the stations.

[0079] Figs. 5A and 5B provide a visual illustration of the images corresponding to some of the signals described above utilizing the method and embodiment described above. In this regard, images 104 and 106 generally correspond to the actual images captured by the first and second cameras 62 and 64, respectively. As described above, associated image signals I-62 and I-64 are transmitted to the differential key generators 70 and 72, respectively. The differential key generators 70 and 72 compare the images 104 and 106 to the images 108 and 110 associated with the differential reference signals DRS-62 and DRS-64 which are received from storages 74 and 76, respectively, and which were previously generated by cameras 62 and 64 from an identical fixed camera position.

[0080] As illustrated in Fig. 5A, the differential key generators 70 and 72 generate differential signals VS-1 and VS-2 which have corresponding images 112 and 114. Notice that these images 112 and 114 comprise an image of the participants which are situated at the first station 12 with the background area having been removed or tagged as a "zero" area. As described herein, this "zero" area becomes "filled-in" with the desired or predetermined composite image which may include, for example, an image of at least a portion of the predetermined setting or background of the second station 14. It has been found that removing a portion of the image, such as the background, by tagging it as zero, in the manner described herein, facilitates compressing the signals VS-1 and VS-2 and reducing the amount of bandwidth needed to transmit the images over transmission network 84 and between the first and second stations 12 and 14.

[0081] As mentioned above, the video signals VS-1 and VS-2 are fed into CODECs 78 and 80 which compresses the signals along with audio signal AS-A1 and AS-A2 and generates signals CDS-1 and CDS-2. The CDS-1 and CDS-2 signals are then transmitted, via transmission network 84, to the second station 14 and received by the CODECs 78-1 and 80-1 associated with the second station 14. As-illustrated in Fig. 5B, the CODEC 78-1 and 80-1 decompresses the CDS-1 and CDS-2 signals, respectively, from the first station 12 and feeds them into associated line doublers 86-1 and 88-1. As mentioned earlier herein, the line doublers 86-1 and 88-1 facilitate enhancing the images associated with the video signals to provide enhanced video signals EVS-1 and EVS-2 (Fig. 5B), respectively.

[0082] As stated earlier, the enhanced video signals EVS-1 and EVS-2 are then received by the video compositing multiplexer 92-1 associated with the second station 14 wherein the signals are combined to provide an intermediate composite signal ICS having an associated intermediate composite signal image 120 having an aspect ratio of about 8:3.

[0083] The video compositing multiplexer 92-1 also receives the predetermined composite signal B having a predetermined composite signal B image 122 from storage 94-1. The video compositing multiplexer 92-1 composites or combines the images 120 and 122 to generate the composite signal having an associated or corresponding composite image 124 as shown in Fig. 5B. As stated earlier, the predetermined composite signal B image 122 generally corresponds to at least a portion of the predetermined setting or background of the second station 14 and has an aspect ratio of 16:9.

[0084] Notice that when the predetermined composite signal B image 122 is combined with the intermediate composite signal image 120, the video compositing multiplexer 92-1 causes the "zero" area of the intermediate composite signal image 120 to be "filled in" with the predetermined composite signal B image.

[0085] The composite image 124 may then be scaled to a predetermined size or scale, such as full scale, using scaler 94-1, so that the composite image 124 may be scaled to a substantially full scale or real-life size image as desired. The composite image signal corresponding to the composite image 124 is transmitted to the projector 96-1 and then displayed on the rear projection screen 46-1 at the second station 14. As illustrated in Figs. 1B and 5B, the composite image 124 may be appropriately framed or masked (such as with an archway 125 in Figs. 1B and 5B) when it is projected at the second station 14 to enhance the face-to-face, real time

environment.

[0086] The audio and video signals transmitted between the first and second stations 12 and 14 may be, in this illustration, transmitted over separate T-1 lines (not shown) in the transmission network 84 in order to effect a substantially simultaneous and/or "real time" video conference. Thus, in the illustration shown in Figs. 1A and 1B, the participants may be geographically remotely located, yet the participants situated at the first station 12 will feel as if the second station 14 participants are located face-to-face or present with them at the first station 12, while the participants situated at the second station 14 will feel as if the first station participants are face-to-face or present with them at the second station.

[0087] It should be appreciated that when the predetermined composite signal B and associated predetermined composite signal image 122 is composited with the intermediate composite signal and associated intermediate composite signal image 120, it overlays that signal to provide a seamless composite image 124, which facilitates reducing or eliminating the need to match up the borders or seams of the camera images with any high degree of accuracy. In this regard, it is preferable that cameras 62 and 64 and 62-1 and 64-1 preferably be situated such that they capture an entire participant rather than, for example, half of a participant. Thus, it may be desired to position the participants in a location such that any particular participants will not be in the field of view of more than one camera.

[0088] Advantageously, the invention provides an apparatus and method for providing a video mirror at each station 12 and 14 which facilitates creating a face-to-face and non-interrupted image of any participants in the video conference. Because the image of the participants is differentiated, less transmission bandwidth, computer memory and the like is required. Also, the differentiators and compositors of the present invention enable a user to create a composite image 124 (Fig. 5B) having at least a portion thereof imaged at a greater resolution than the portion which was transmitted over transmission network 84. This facilitates reducing the effect of limitations or transmission restrictions of the transmission network 84 which, in turn, facilitates increasing the quality of images displayed at a station.

[0089] In addition, notice that the composite image 124 (Fig. 5B) may have an aspect ratio which is different from the aspect ratio of the cameras 62 and 64. This enables the system and method of the present invention to utilize cameras which generate images having smaller or even larger aspect ratios. This also enables the system and method to use cameras having standard or common aspect ratios, such as 4:3.

[0090] Figs. 3A and 3B, when taken together, illustrate another embodiment of the invention. The operation and components of the embodiment shown in Figs. 3A and 3B are substantially the same as the operation of components of the embodiment described above relative to Figs. 1A and 1B with the same reference numerals being used for the same components with the addition of single prime (') designator. Consequently this embodiment is similar to the embodiment shown in Figs. 1A and 1B, except that the second predetermined setting 14a' in Fig. 3B and its associated theme, aura or motif is substantially different from the second predetermined setting 14a shown in Fig. 1B. In Fig. 3B, the first predetermined sensory setting 12a' comprises a plurality of decorations 120 defining the Chinese theme, motif or aura. Also, the predetermined composite signal A stored in storage 94-1' and the differential reference signals stored in storages 74-1' and 76-1 would generally correspond to an image of least a portion of that setting 14a'.

[0091] As with the illustration described above relative to Figs. 1A and 1B, the video and audio signals would be processed in substantially the same manner. In general, an image of the participants situated at the first station 12' is composited by compositor 92-1' with a predetermined composite image of at least a portion of the second predetermined sensory setting 14a' of the second station 14' and projected onto the rear projection screen 46-1' at the second station 14'. The first station 12' participants appear to be face-to-face with the second station 14' participants because they have a relatively high resolution video image behind them which complements or becomes integrated with the second predetermined sensory setting 14a'. Thus, as shown in Fig. 3B, the image 91-1' (Fig. 3B) of the ladies at the first station 12' includes a Chinese background which blends or complements the actual predetermined sensory setting 14a'.

[0092] Likewise, when the image of the participants situated at the second station 14' is projected on the rear projection screen 46' at the first station 12', they appear to be in the same room as the participants situated at the first station 12' because the Roman/Italian video background which is seen behind the second station 14' participants generally complements and becomes visually integrated with the actual Roman/Italian theme, motif or aura defined by the first predetermined sensory setting 12' of the first station 12'.

[0093] Figs. 4A and 4B, when taken together, illustrate another embodiment of the invention. The components of the embodiment shown in Figs. 4A and 4B which are substantially identical to the components in the embodiment shown in Figs. 1A and 1B which have the same reference numerals with the addition of a double prime (") designators. As illustrated in Figs. 4A and 4B, two remote modular stations such as stations 12" and 14" may be provided and designed to have first and second predetermined sensory settings 12a" and 14a" which are substantially identical. Thus, as shown in Figs. 4A and 4B, images may be captured in the manner described above at station 12" received by CODECs 78" and 80" and then transmitted, via transmission 84", to associated CODECs 78-1" and 80-1", respectively. The CODECs 78-1" and 80-1" then generate a decom-

pressed signal which may be enhanced by line doublers 86-1" and 88-1", respectively; scaled to an appropriate scale by scaler 95-1"; and then projected by projector 96-1" onto rear projection screen 46-1".

[0094] Notice that the image comprising the second station 14" participants and second predetermined sensory setting 14a" is displayed on screen 46" at the first station 12". Thus, this embodiment does not utilize the differentiating and compositing features of the previous embodiment, but may still achieve a face-to-face conference environment because the second predetermined sensory setting 14a" is configured to be identical to or complementary with the first predetermined sensory setting 12a". In this embodiment, entire images or sub-images of the stations 12 and 14 (including images of both participants and background) are displayed at remote station(s). Because the stations 12" and 14" are assembled, decorated and designed to be complementary or identical, they appear visually integrated to participants situated in the stations 12 and 14. Accordingly, the first and second predetermined sensory settings 12a" and 14a", including the background, are designed and arranged in a geometric fashion such that as cameras 62" and 64" capture images of the participants, they also capture images of the first and second predetermined sensory setting 12a" and 14a", respectively, at the most advantageous perspective for display at the remote station(s). As with prior embodiments, this causes the first station 12" participants to perceive that the second station 14" participants are situated or present with the first station 12" participants at the first station 14". Likewise, the first station 12" participants appear to be face-to-face with the second station 14" participants at the second station 14" when the images associated with the first station 12" are displayed on screen 46-1". Consequently, by providing complementary or identical first and second predetermined sensory settings 12a" and 14a", a face-to-face conference may be created. As with previous embodiments, it may also be desired to differentiate, enhance, composite or scale the images as described with previous embodiments, but this is not required with the embodiment being described.

[0095] Thus, it should be apparent that stations can be provided with predetermined settings which are completely different, yet, by utilizing the apparatus and method of the present invention, the images of the participants in these stations may be projected at remote stations so that they appear to be virtually face-to-face with the remote station participants at or one more remote station.

[0096] Various changes or modifications in the invention described may occur to those skilled in the art without departing from the spirit or scope of the invention. For example, the screen 46 for station 12 has been shown as being integral with a portion of a wall 32h (Figs. 1A and 2A), it could comprise a larger or smaller portion of that wall 32h, or it could be provided as part of one or more other walls, or even as part of the ceiling 34.

[0097] It should also be appreciated that while the embodiments have been shown and described comprising two stations, images from more than two remote stations may be displayed at a station, thereby permitting a teleconference convention among more than two stations.

[0098] Although not shown, one or more of the compositors, such as compositors 12 or 12-1 (Fig. 1A) may comprise a stationary or moving image database (not shown) for providing a plurality of predetermined composite signals which define a particular or desired video background. For example, participants may elect to use the arched background of their proximity, choose an event-related scene, or decide to meet in a setting completely unrelated to their site or station. For example, a station having a Manhattan eatery motif may be provided with a screen configured as a window (not shown). Certain moving video backgrounds of a busy New York avenue may be deposited and displayed on the screen to give the illusion that the participants situated at the station are dining in a popular Manhattan eatery.

[0099] It should also be appreciated that while the embodiments being shown and described herein refer to teleconferencing environments that have predetermined settings and motifs or auras relating to dining, the predetermined settings could define any type of aura, theme or motif which is suitable for video conferencing and in which it is desired to provide a "real-life" or face-to-face presence illusion. For example, the apparatus and method of this invention could be used in a business setting, education setting, seminar setting, home environment, religious setting, celebration setting (such as a birthday, retirement party, holiday or anniversary), or any other suitable setting as desired.

[0100] The above description of the invention is intended to be illustrative and not limiting, and is not intended that the invention be restricted thereto but that it be limited only by the spirit and scope of the appended claims.

Claims

1. A teleconferencing system (10)comprising two or more teleconferencing stations (12; 14) remote from each other, each of said stations being equipped with:

audio devices (82, 100; 83, 102) and video devices including a plurality of cameras (62, 64) for the exchange of audio and video transmissions between said teleconferencing stations;

a screen (46) having a first side and a second side said second side being opposite said first side,for displaying a first image (104) of at least one first remote subject and a second image

(106) of at least one second remote subject, said at least one first subject including a remote participant who is not included in said at least one second subject and said first and second images are not entirely overlaid on top of each other when they are displayed on said screen (46);
a first plurality of furnishings (60) on which participants situated at said teleconferencing station (12) may be seated, and which are situated on said second side of said screen;
said first image and said second images are being displayed on said screen (46) to give any of the participants seated on said first plurality of furnishings the feeling of being in the same room and face-to-face with said remote participant;

characterized in that said plurality of cameras (62, 64) of a first station (12) are situated behind said first side of said screen (46) for capturing a plurality of images at said first station, said plurality of cameras capturing images of different participants situated on said second side of said screen (46), and **in that** said first station (12) further comprises at least one wall 32 (a-h), at least one ceiling (34) and/or a second plurality of furnishings (50) so that, when the first or second images are being displayed on said screen (46) of said first station (12) participants seated at said first station feel as if they are in the same room with said remote participant of participants.

2. The teleconferencing system as recited in claim 1, wherein said second plurality of furnishings (50) in the first station (12) comprises at least one table having one side associated with said screen (46) and configured to cause said participants to be situated a predetermined distance (B) from said screen.

3. The teleconferencing system as recited in claim 1, wherein said screen (46)of the first station (12) comprises at least one aperture (66, 68), said plurality of cameras (62, 64) are capturing said plurality of images through said at least one aperture.

4. The teleconferencing system as recited in claim 1, wherein said first image comprises at least one remote participant which is substantially life-size when shown on said screen (46) of said first station (12).

5. The teleconferencing system as recited in claim 1, wherein said plurality of cameras (62, 64) of said first station (12) are situated directly in a projection path of said screen (46).

15. A method for teleconferencing in a teleconferencing system (10) having two or more teleconferencing stations (12, 14) remote from each other and being equipped with audio devices (82, 100; 83, 102) and video devices including a plurality of cameras (62, 64) for the exchange of audio and video transmissions between said teleconferencing stations, the method comprising, in each of said stations (12, 14), the steps of:

providing a screen (46) having a first side and a second side said second side being opposite said first side, for displaying a first image of a least one first remote subject and a second image of at least one second remote subject; said at least one first remote subject including a participant who is not included in said at least one second remote subject and said images are not entirely overlaid on top of each other when they are displayed on said screen;
providing a first plurality of furnishings (60) on which participants situated at said teleconferencing station (12,14) may be seated and which are to be placed on said second side of said screen (46);
displaying said first image and said second image on said screen (46) to give participants seated on said first plurality of furnishings the feeling of being in the same room and face-to-face with said remote participant; said method being **characterized by** comprising the further steps of:

situating said plurality of cameras (62, 64) of a first station (12) behind said first side of the screen (46) for capturing a plurality of images at said first station (12), said plurality of cameras capturing images of different participants situated on said second side of said screen of said first station (12);
providing at least one wall (32a-h), at least on ceiling (34) and/or a second pluarlity of furnishings (50) in said first station (12), and
displaying on said screen (46)of said first station at least one of said first image (104) or said second image (106) so that participants seated in said first station (12) feel as if they are in the same room with said remote participant or participants.

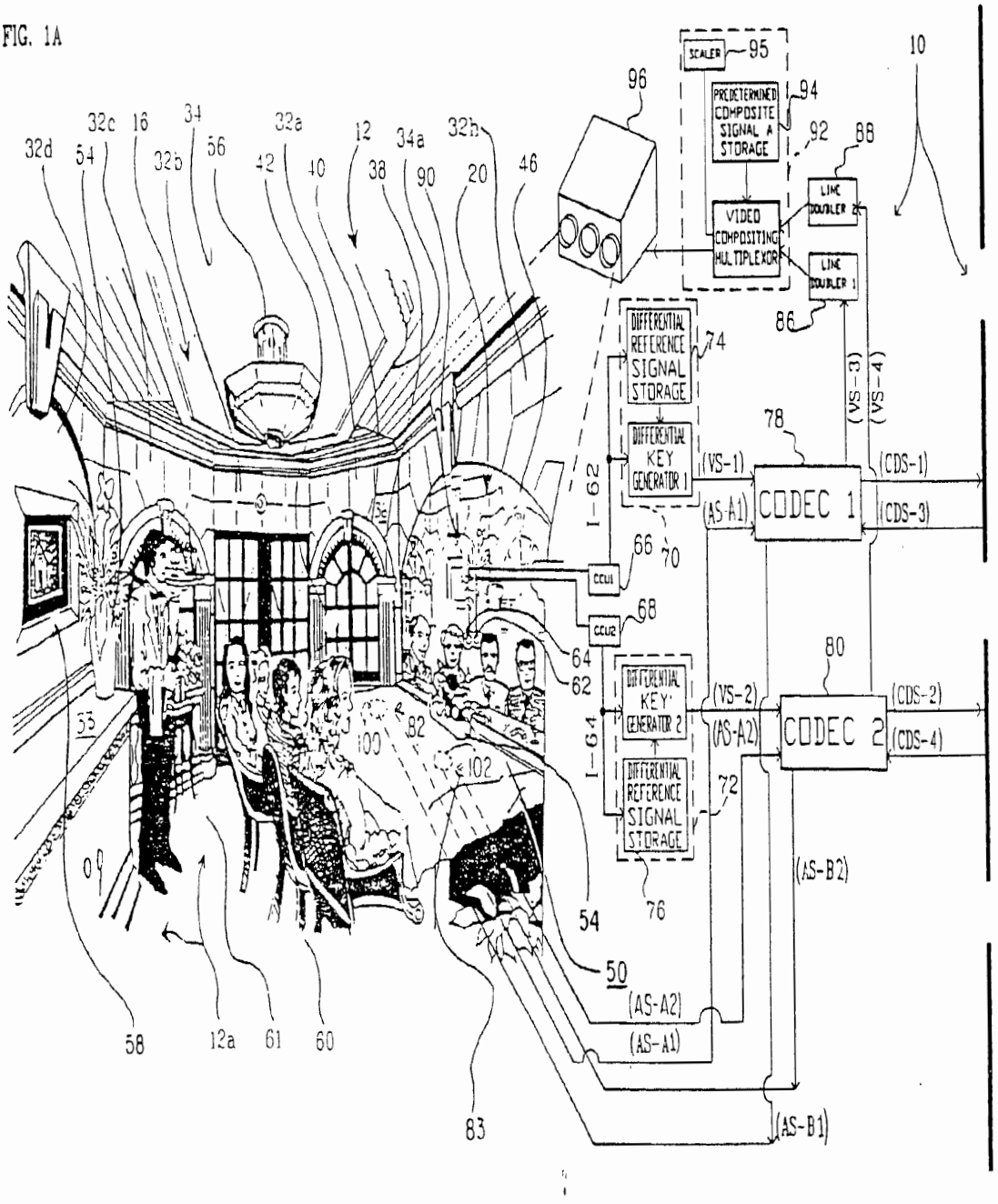
7. The method as recited in claim 6, wherein said step of providing said second plurality of furnishings (50) further comprises the step of providing at least one table having one side associated with said screen (46) and configured to cause said participants to be situated a predetermined distance (B) from said screen.

8. The method as recited in claim 6, wherein said screen (46)of said first station (12) is provided with least one aperture (66, 68) and wherein said plurality of cameras (62, 64) situated behind said screen captures said plurality of images through said at least one aperture.

9. The method as recited in claim 6, wherein either said first image or said second image comprises at least one remote participant in substantially life-size when said first image or said second image, respectively, is shown on said screen (46) of said first station (12).

10. The method as recited in claim 6, wherein said method further comprises the step of situating said plurality of cameras (62, 64) directly in a projection path of said screen (46) of said first station (12).

FIG. 1A



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FIG. 1B

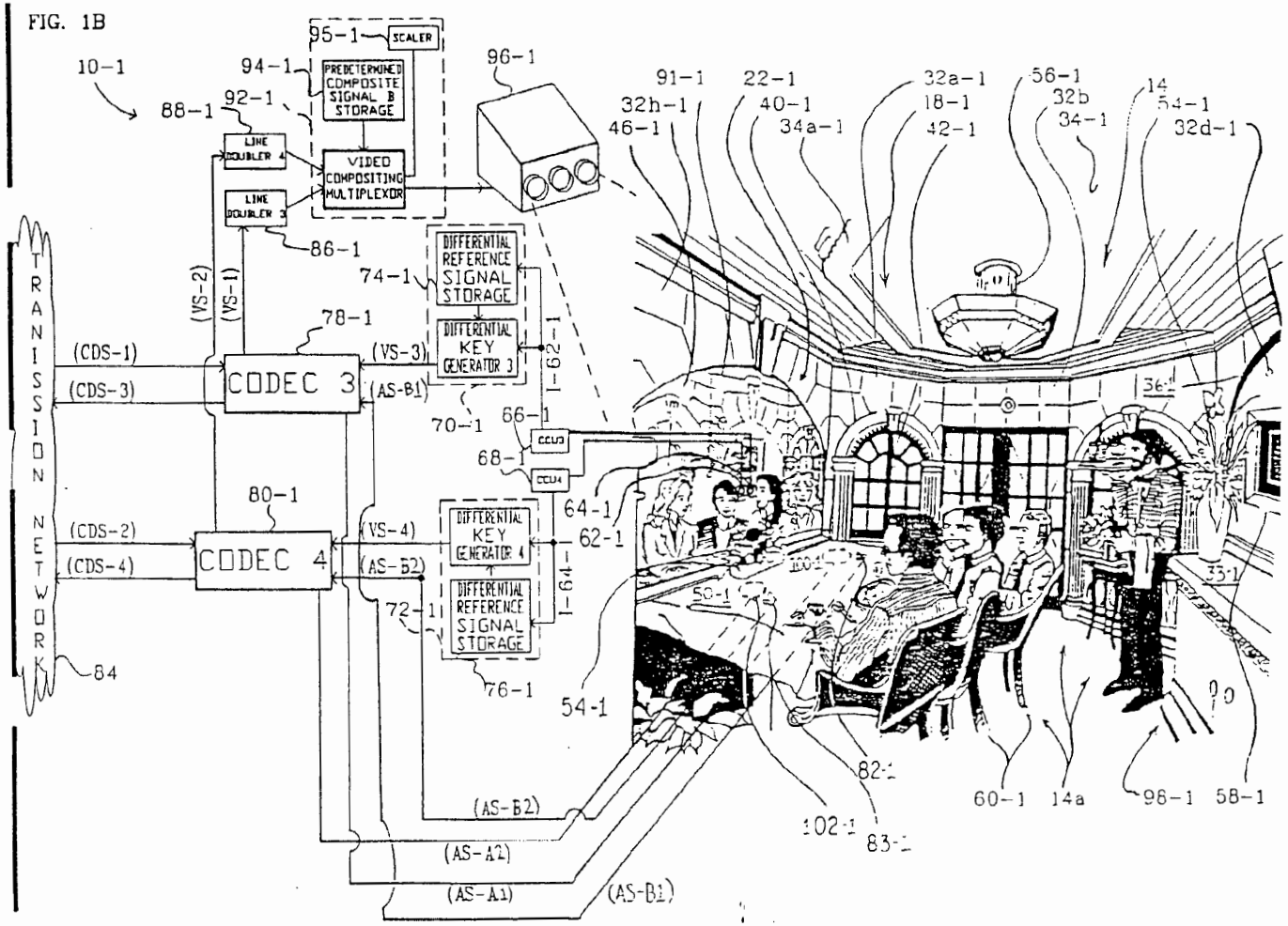

10-1
88-1
92-1
94-1
95-1
SCALER
PREDETERMINED COMPOSITE SIGNAL B STORAGE
VIDEO COMPOSITING MULTIPLEXOR
LINE DOUBLER 4
LINE DOUBLER 3
96-1
86-1
TRANSMISSION NETWORK
84
(VS-2)
(VS-1)
74-1
DIFFERENTIAL REFERENCE SIGNAL STORAGE
DIFFERENTIAL KEY GENERATOR 3
62-1
78-1
(CDS-1)
(CDS-3)
CODEC 3
(VS-3)
(AS-B1)
70-1
66-1
68-1
80-1
(CDS-2)
(CDS-4)
CODEC 4
(VS-4)
(AS-B2)
DIFFERENTIAL KEY GENERATOR 4
64-1
62-1
DIFFERENTIAL REFERENCE SIGNAL STORAGE
72-1
64-1
76-1
54-1
(AS-B2)
(AS-A2)
(AS-A1)
(AS-B1)
91-1
32h-1
46-1
22-1
40-1
34a-1
32a-1
18-1
42-1
56-1
32b
34-1
14
54-1
32d-1
36-1
50-1
60-1
14a
96-1
58-1

FIG. 2

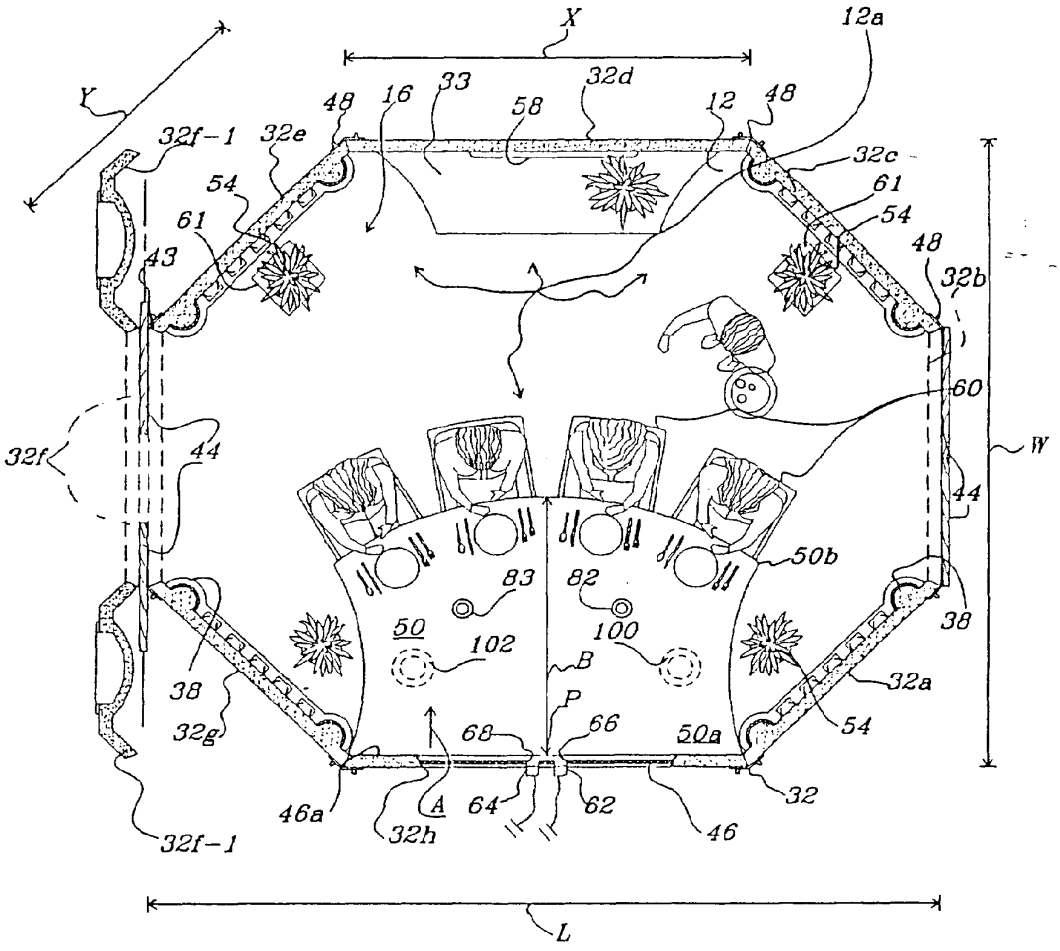
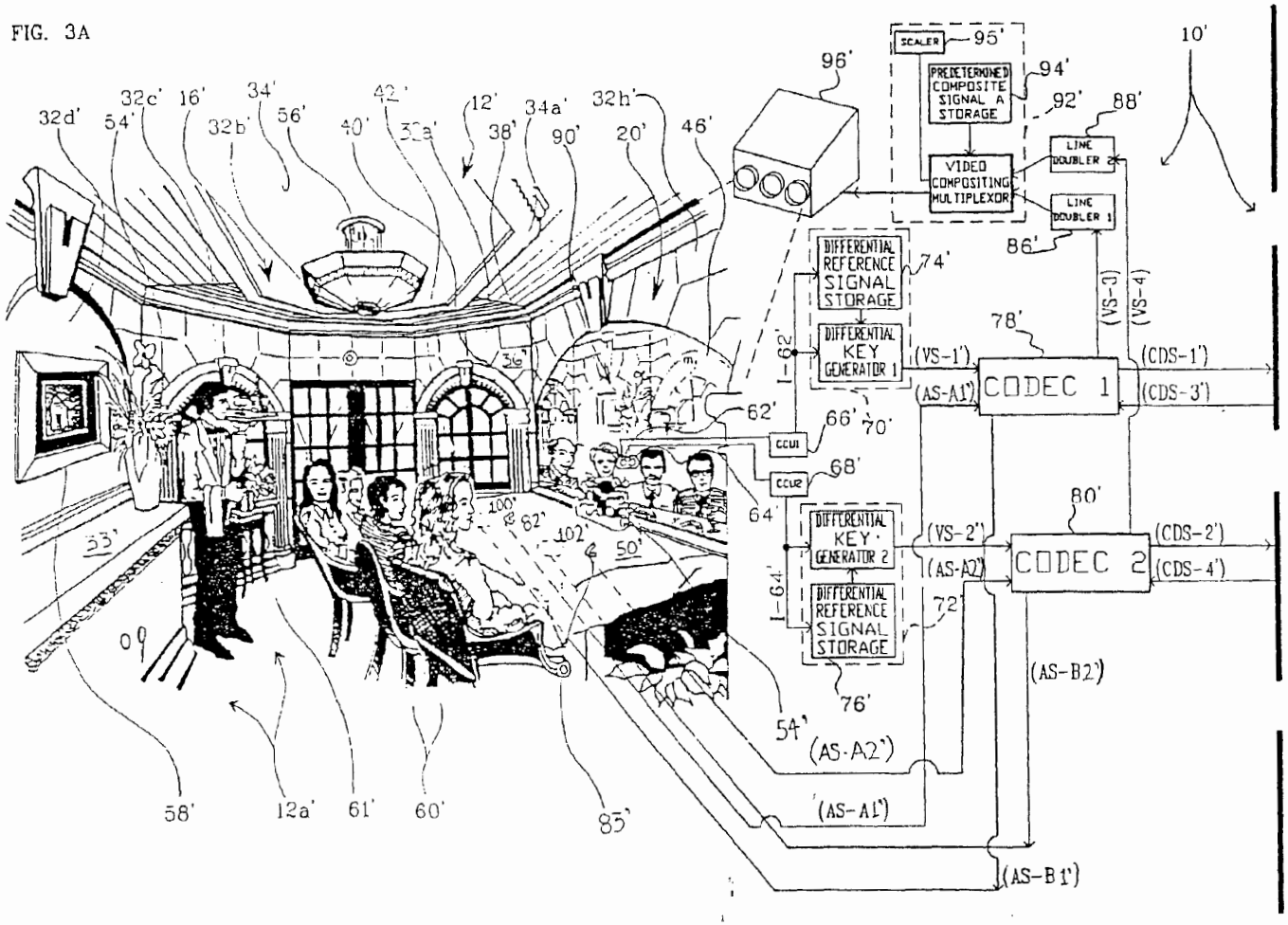

X
12a
Y
48
16
33
58
32d
12
48
32f-1
32e
32c
54
61
61
54
43
48
32b
60
32f
44
W
44
50b
83
82
38
50
102
100
B
38
32a
32g
P
68
66
50a
54
A
64
62
46
32
46a
32h
32f-1
L

FIG. 3A



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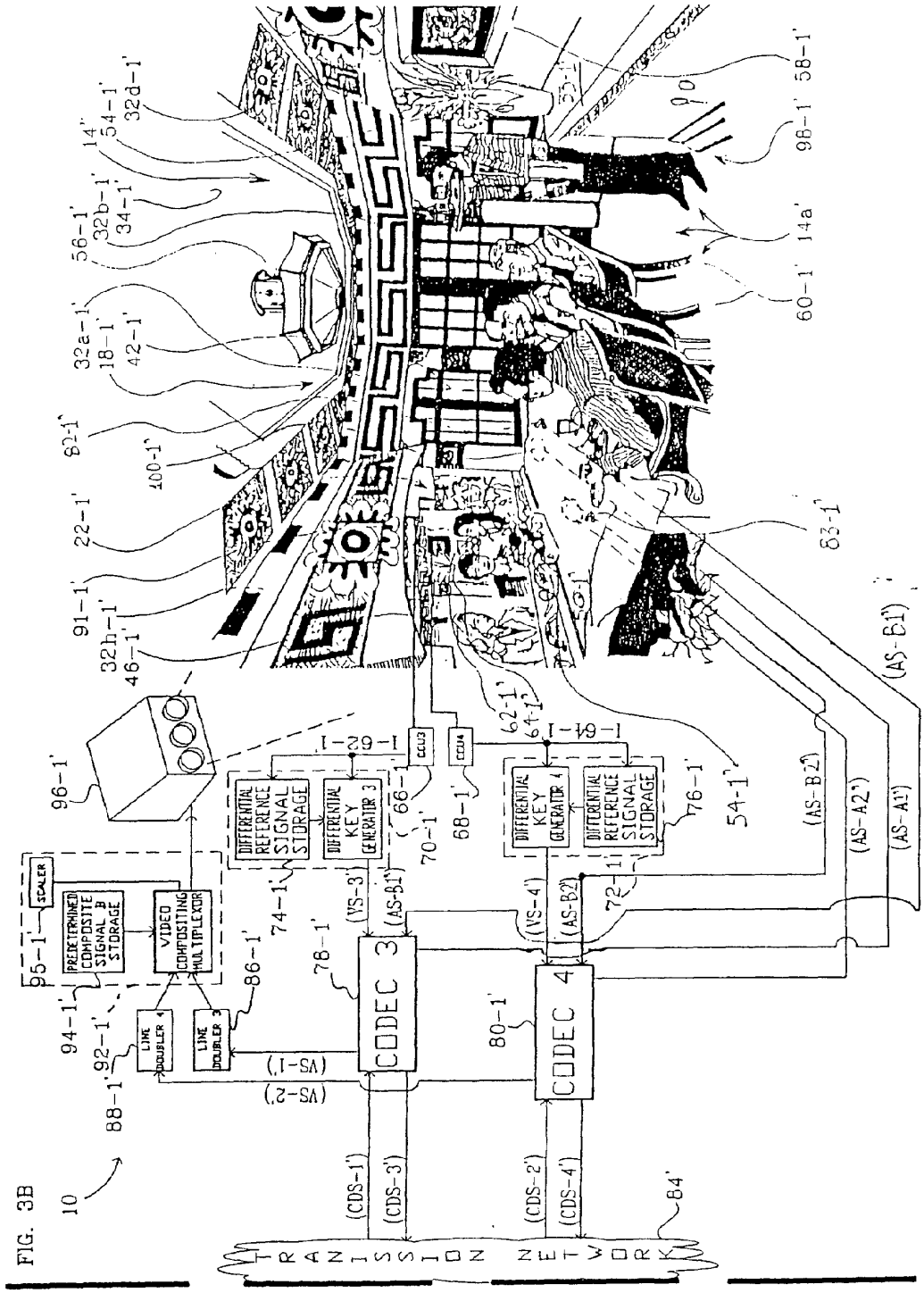
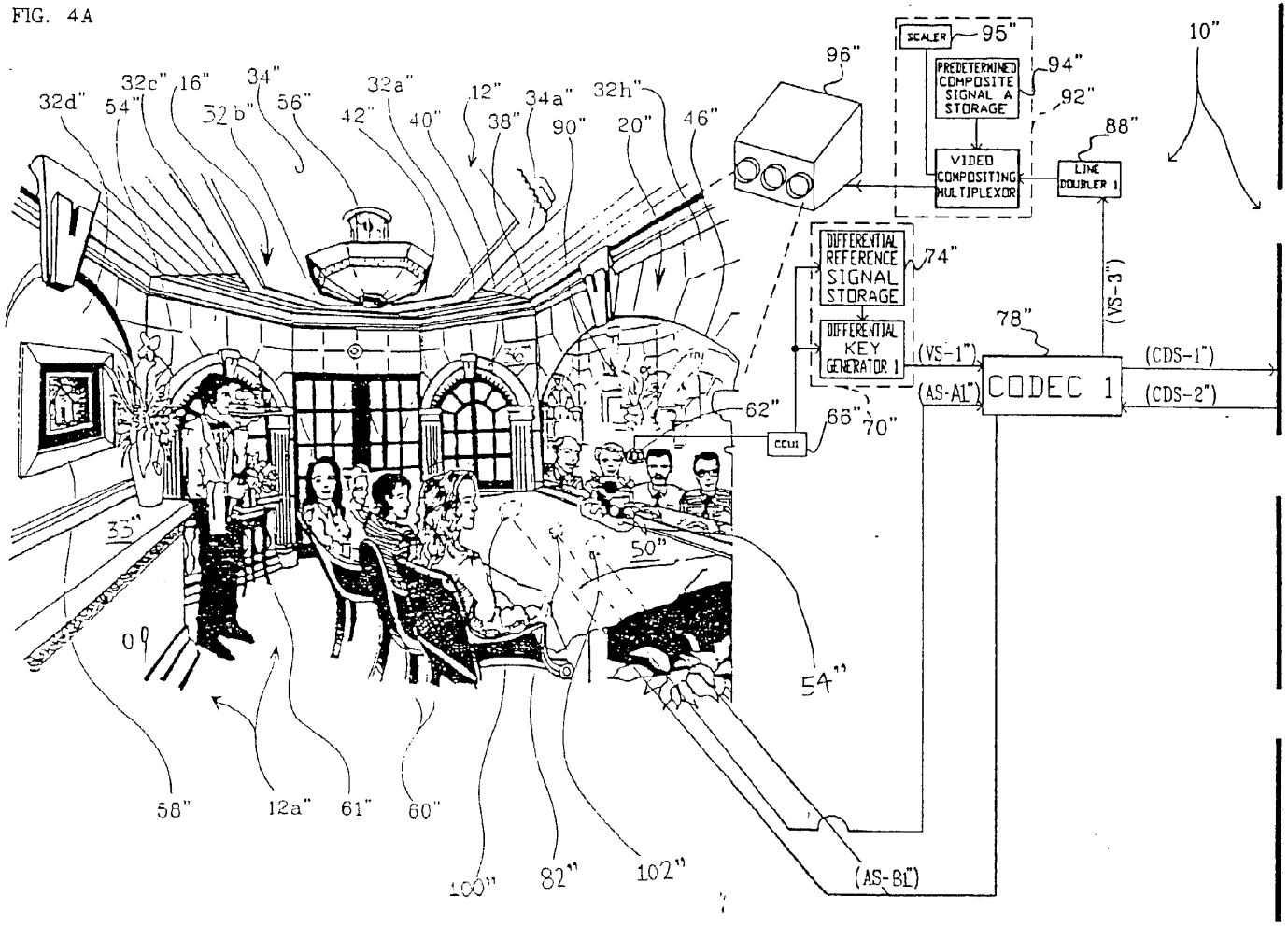

TRANSMISSION NETWORK
CODEC 3
CODEC 4
DIFFERENTIAL REFERENCE SIGNAL STORAGE
DIFFERENTIAL KEY GENERATOR 3
DIFFERENTIAL KEY GENERATOR 4
VIDEO COMPOSITING MULTIPLEXOR
PREDETERMINED COMPOSITE SIGNAL B STORAGE
SCALER
LINE DOUBLER
(CDS-1')
(CDS-2')
(CDS-3')
(CDS-4')
(VS-1')
(VS-2')
(VS-3')
(VS-4')
(AS-A1')
(AS-A2')
(AS-B1')
(AS-B2')
10
14"
14a'
18-1'
22-1'
32a-1'
32b-1'
32d-1'
32h-1'
34-1'
42-1'
46-1'
54-1'
56-1'
58-1'
60-1'
62-1'
63-1'
64-1'
66-1'
68-1'
70-1'
72-1'
74-1'
76-1'
78-1'
80-1'
83-1'
84'
86-1'
88-1'
91-1'
92-1'
94-1'
95-1'
96-1'
98-1'
400-1'

FIG. 3B

FIG. 4A



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FIG. 4B

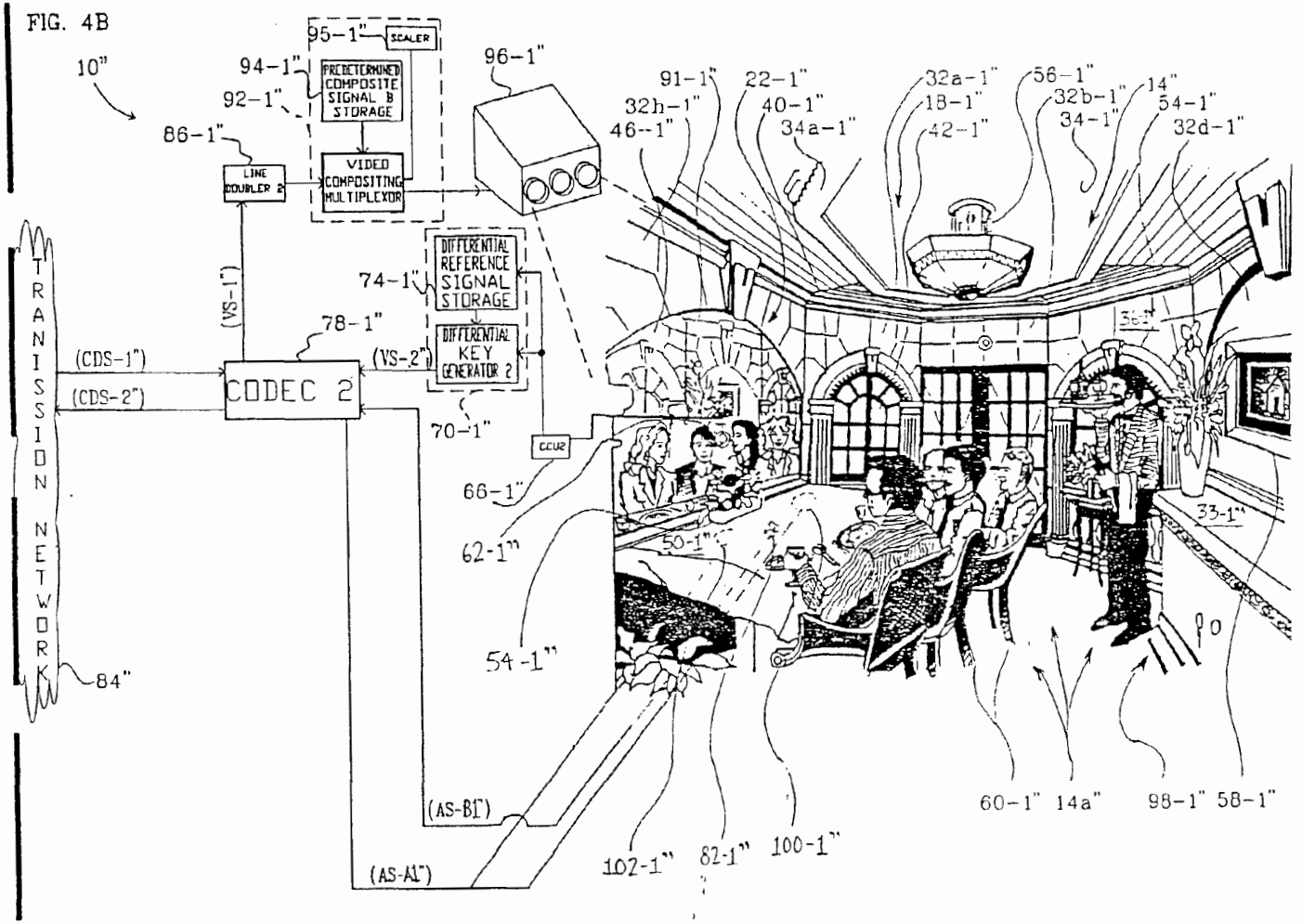

10"
95-1"
SCALER
94-1"
PREDETERMINED COMPOSITE SIGNAL B STORAGE
92-1"
86-1"
LINE DOUBLER 2
VIDEO COMPOSITING MULTIPLEXOR
96-1"
91-1"
32h-1"
46--1"
22-1"
40-1"
34a-1"
32a-1"
18-1"
42-1"
56-1"
32b-1"
34-1"
14"
54-1"
32d-1"
DIFFERENTIAL REFERENCE SIGNAL STORAGE
74-1"
DIFFERENTIAL KEY GENERATOR 2
(VS-1")
78-1"
(VS-2")
(CDS-1")
(CDS-2")
CODEC 2
70-1"
CCU2
66-1"
62-1"
54-1"
TRANSMISSION NETWORK
84"
(AS-B1")
(AS-A1")
102-1"
82-1"
100-1"
60-1"
14a"
98-1"
58-1"
50-1"
33-1"

FIG. 5A

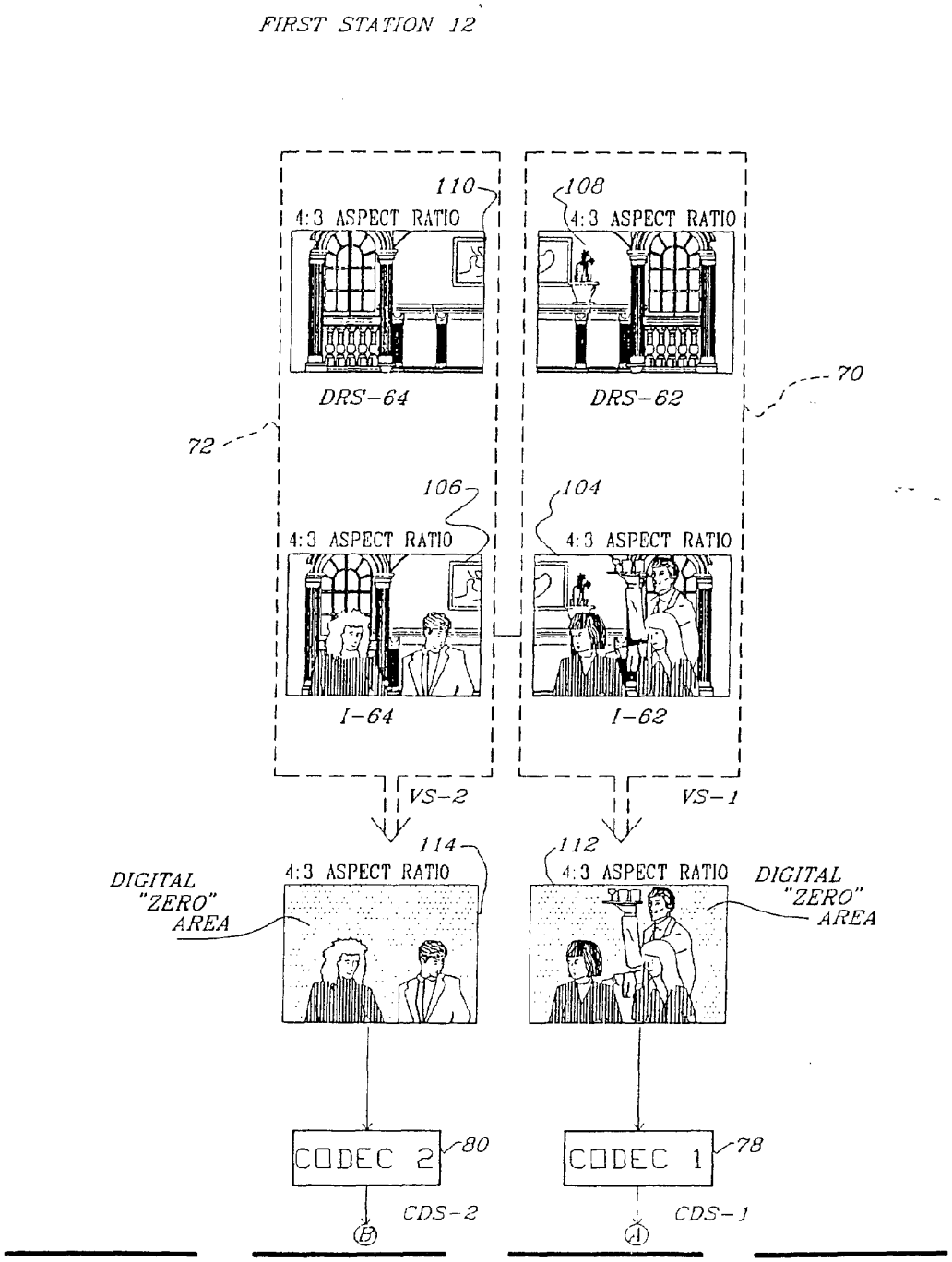

FIRST STATION 12
110
4:3 ASPECT RATIO
108
4:3 ASPECT RATIO
DRS-64
DRS-62
70
72
106
4:3 ASPECT RATIO
104
4:3 ASPECT RATIO
I-64
I-62
VS-2
VS-1
114
4:3 ASPECT RATIO
112
4:3 ASPECT RATIO
DIGITAL "ZERO" AREA
DIGITAL "ZERO" AREA
CODEC 2
80
CODEC 1
78
CDS-2
CDS-1
B
A

FIG. 5B
SECOND STATION 14

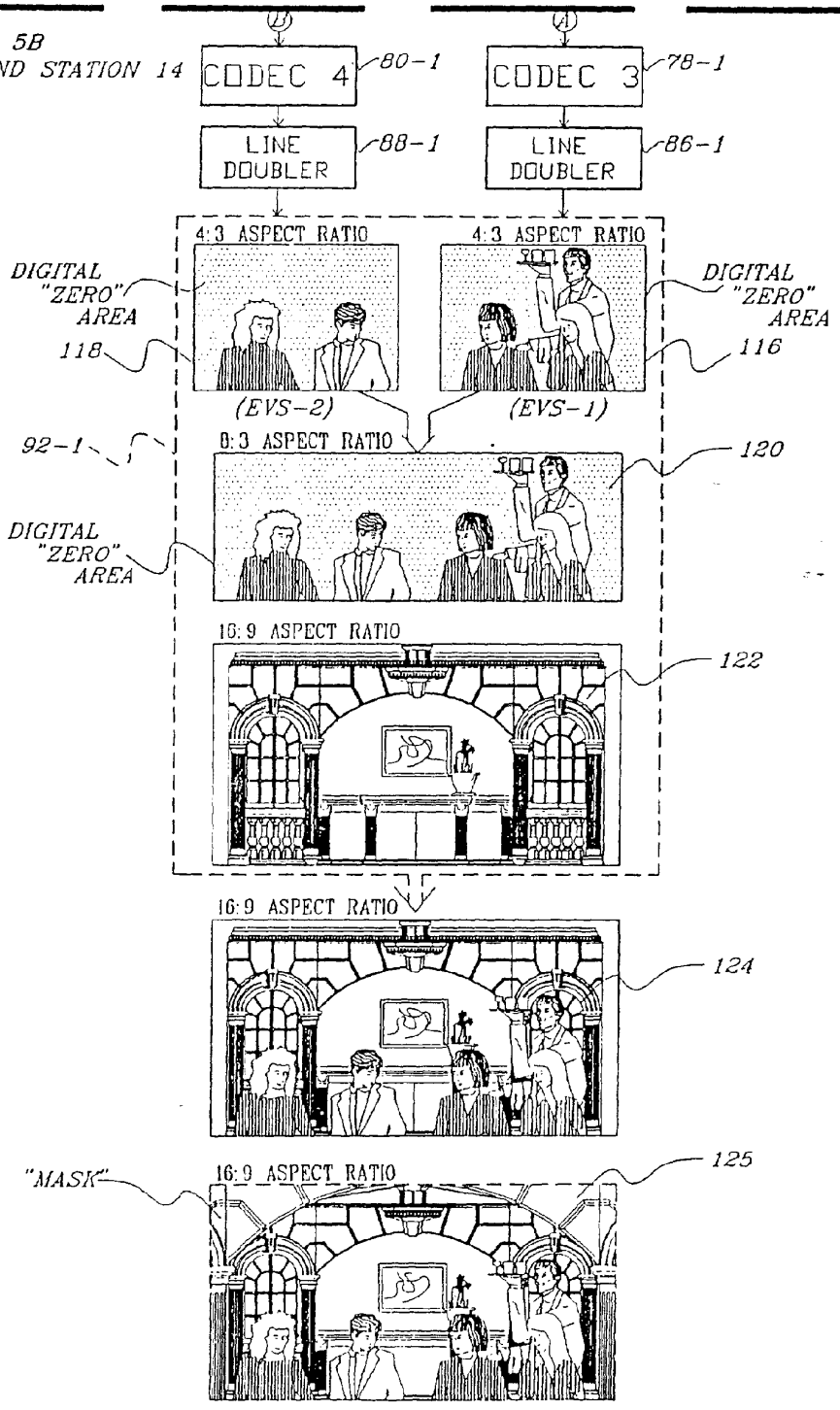
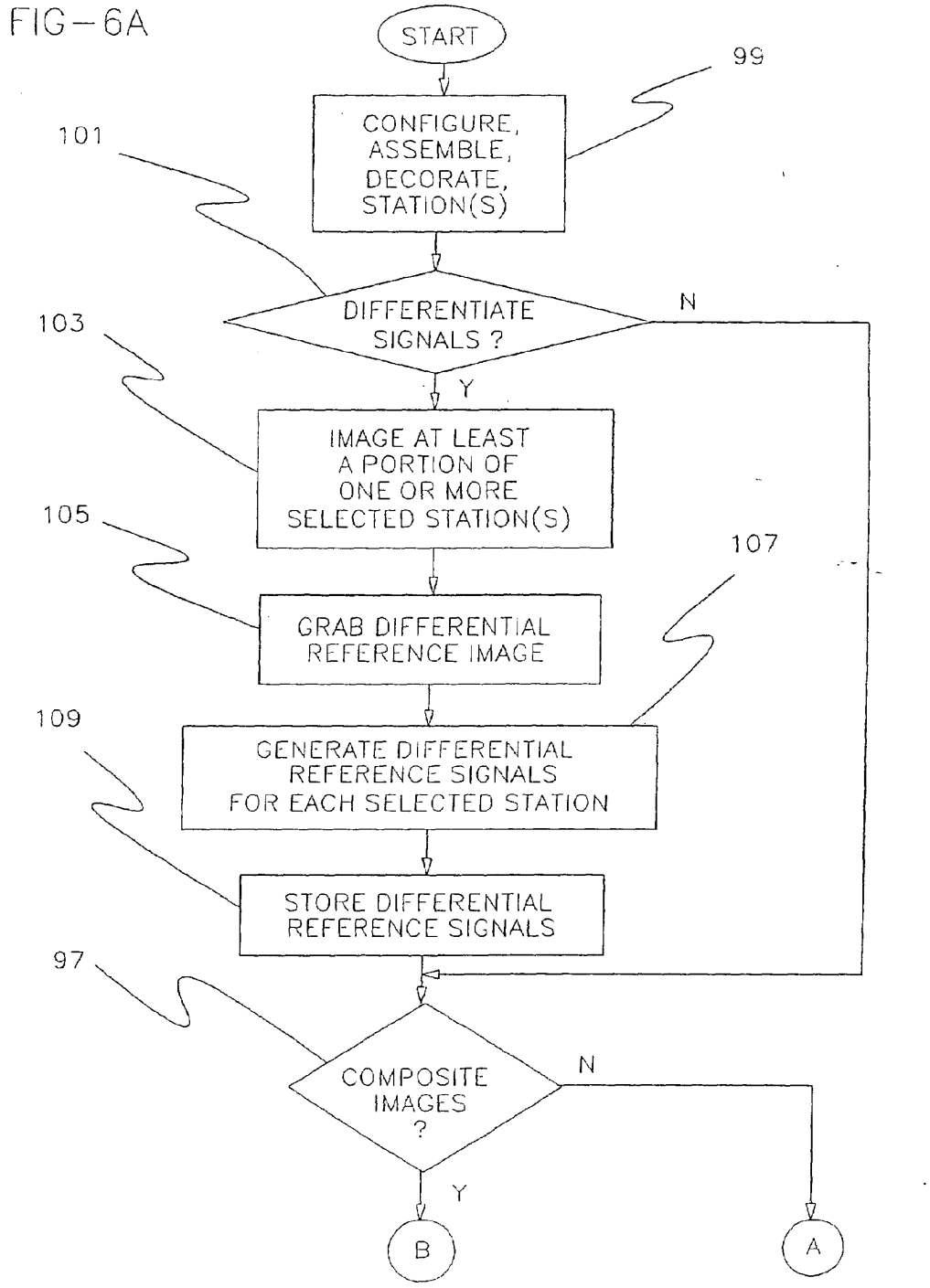


FIG-6A


START
99
CONFIGURE, ASSEMBLE, DECORATE, STATION(S)
101
DIFFERENTIATE SIGNALS ?
N
103
Y
IMAGE AT LEAST A PORTION OF ONE OR MORE SELECTED STATION(S)
105
107
GRAB DIFFERENTIAL REFERENCE IMAGE
109
GENERATE DIFFERENTIAL REFERENCE SIGNALS FOR EACH SELECTED STATION
STORE DIFFERENTIAL REFERENCE SIGNALS
97
COMPOSITE IMAGES ?
N
Y
B
A

FIG–6B

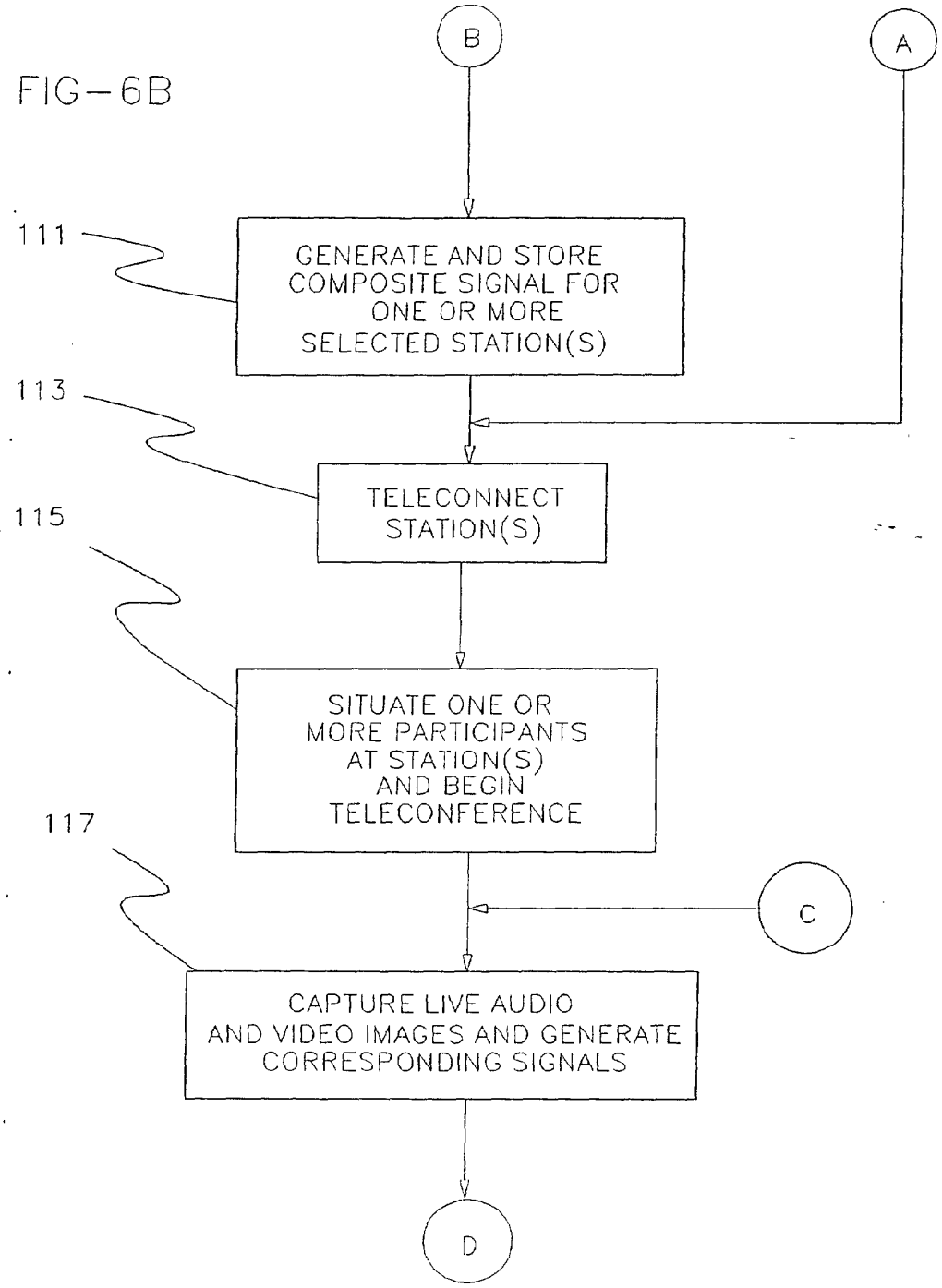

B
A
111
GENERATE AND STORE COMPOSITE SIGNAL FOR ONE OR MORE SELECTED STATION(S)
113
TELECONNECT STATION(S)
115
SITUATE ONE OR MORE PARTICIPANTS AT STATION(S) AND BEGIN TELECONFERENCE
117
C
CAPTURE LIVE AUDIO AND VIDEO IMAGES AND GENERATE CORRESPONDING SIGNALS
D

FIG-6C

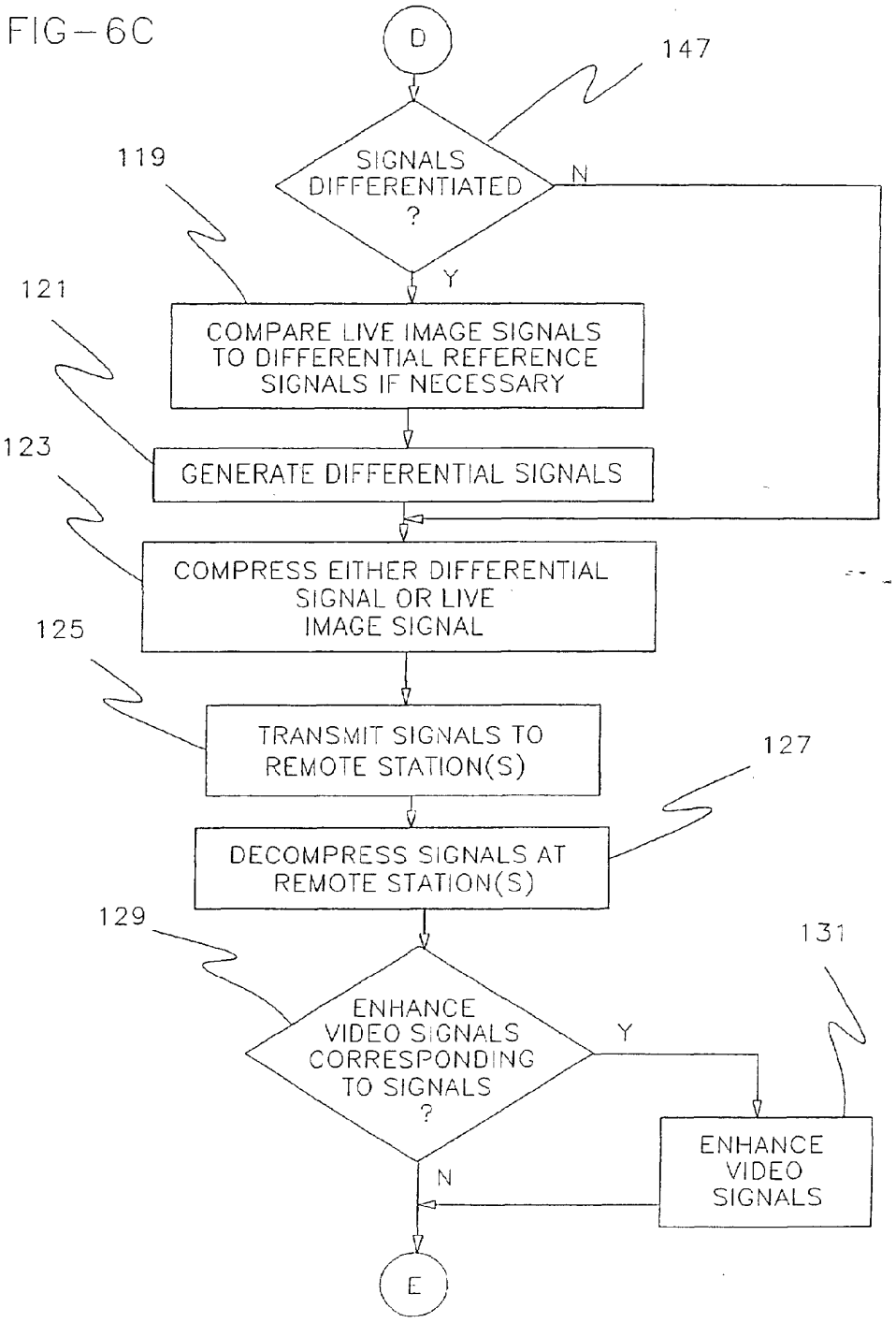
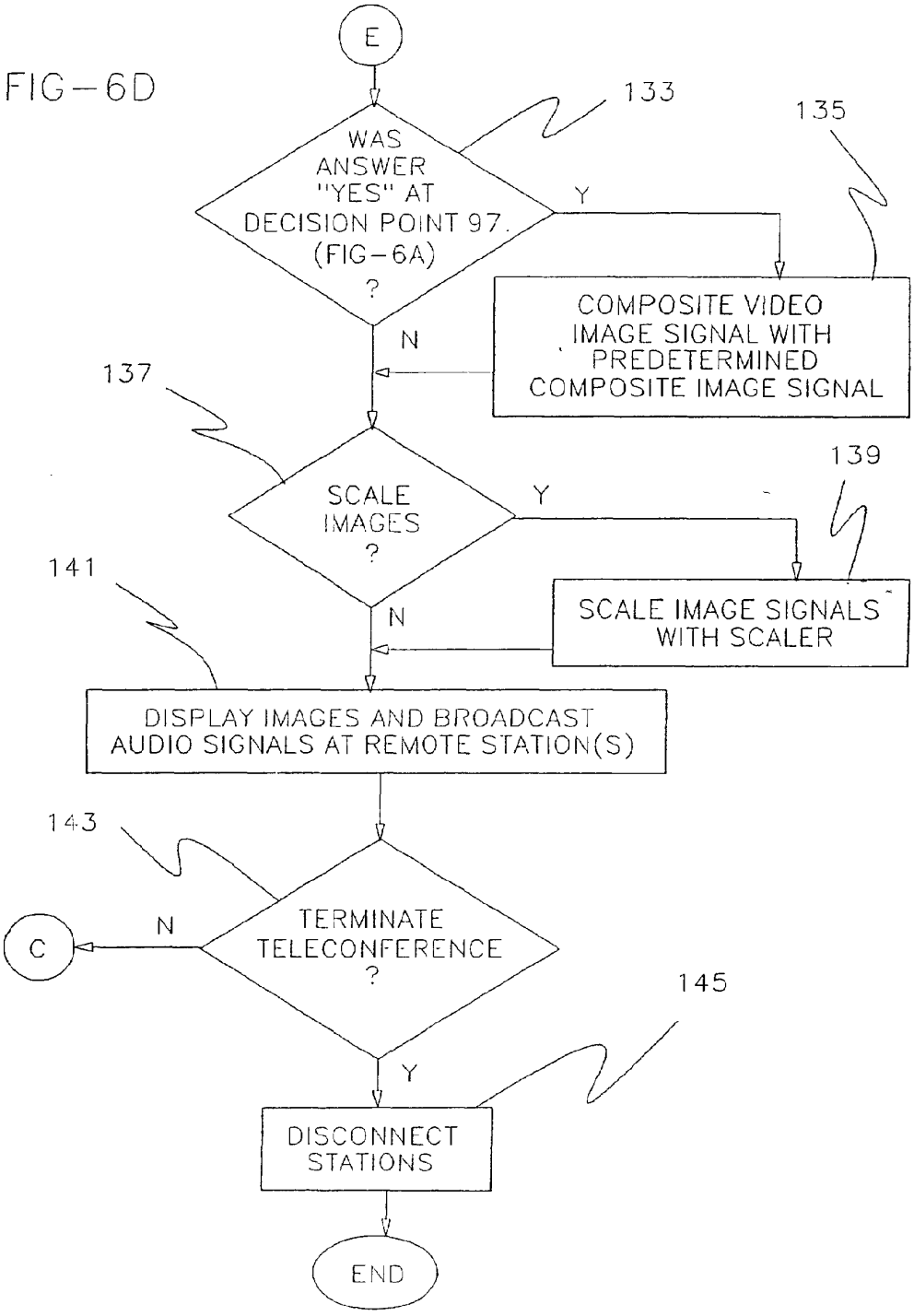

D
147
SIGNALS DIFFERENTIATED ?
N
Y
119
121
COMPARE LIVE IMAGE SIGNALS TO DIFFERENTIAL REFERENCE SIGNALS IF NECESSARY
123
GENERATE DIFFERENTIAL SIGNALS
COMPRESS EITHER DIFFERENTIAL SIGNAL OR LIVE IMAGE SIGNAL
125
TRANSMIT SIGNALS TO REMOTE STATION(S)
127
DECOMPRESS SIGNALS AT REMOTE STATION(S)
129
131
ENHANCE VIDEO SIGNALS CORRESPONDING TO SIGNALS ?
Y
N
ENHANCE VIDEO SIGNALS
E

FIG-6D


E
133
135
WAS ANSWER "YES" AT DECISION POINT 97. (FIG-6A) ?
Y
N
COMPOSITE VIDEO IMAGE SIGNAL WITH PREDETERMINED COMPOSITE IMAGE SIGNAL
137
139
SCALE IMAGES ?
Y
N
SCALE IMAGE SIGNALS WITH SCALER
141
DISPLAY IMAGES AND BROADCAST AUDIO SIGNALS AT REMOTE STATION(S)
143
TERMINATE TELECONFERENCE ?
N
C
Y
145
DISCONNECT STATIONS
END

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 12 8723

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	EP 0 459 419 A (SONY CORP) 4 December 1991 (1991-12-04)	1,6	H04N7/15
A	* the whole document *	2-5,7-10	
Y	US 5 187 571 A (BRAUN DAVID A ET AL) 16 February 1993 (1993-02-16)	1,6	
A	* the whole document *	2-5,7-10	
A	PATENT ABSTRACTS OF JAPAN vol. 017, no. 393 (E-1402), 22 July 1993 (1993-07-22) & JP 05 068246 A (NIPPON TELEGR & TELEPH CORP), 19 March 1993 (1993-03-19) * abstract *	1-10	
A	US 5 127 078 A (TERRY JOYCE E ET AL) 30 June 1992 (1992-06-30) * abstract; figure 9 *	1,3,6,8	
A	US 4 928 301 A (SMOOT LANNY S) 22 May 1990 (1990-05-22) * the whole document *	1-10	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			H04N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	16 January 2002	Greve, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 12 8723

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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16-01-2002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0459419 A	04-12-1991	JP 4033490 A	04-02-1992
		DE 69121015 D1	29-08-1996
		DE 69121015 T2	19-12-1996
		EP 0459419 A2	04-12-1991
		KR 210546 B1	15-07-1999
		US 5272526 A	21-12-1993
US 5187571 A	16-02-1993	CA 2101437 A1	02-08-1992
		EP 0569466 A1	18-11-1993
		JP 2696272 B2	14-01-1998
		JP 6505370 T	16-06-1994
		WO 9214341 A1	20-08-1992
JP 05068246 A	19-03-1993	NONE	
US 5127078 A	30-06-1992	NONE	
US 4928301 A	22-05-1990	CA 1306045 A1	04-08-1992

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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European Patent Office
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(54) Token passing arrangement for a conference call bridge arrangement

(57) A user terminal (10) using an internet protocol using session initiation protocol to interconnect a number of user terminals (11-13) in a conference call. A conference bridge (30) or user terminal (10) detects speech of one of the user terminals (203). A "babble" timer is started (207). The speaker is allowed to continuously speak until silence is detected (217) or until the "babble" timer timers out (211).

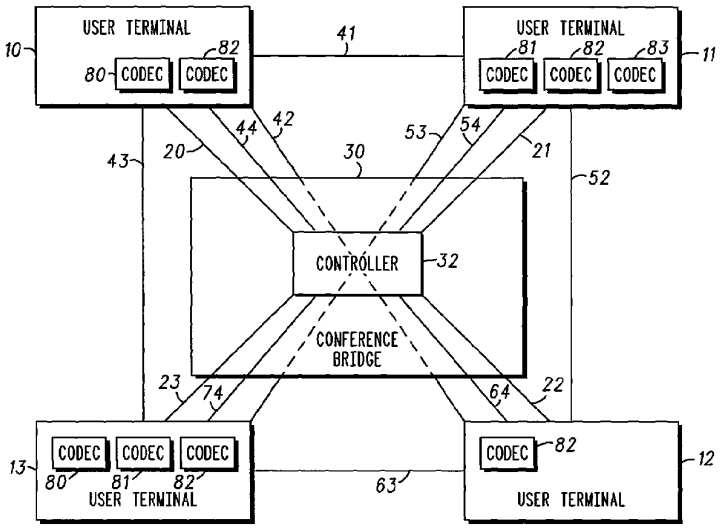


FIG. 1

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Description

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application is related to copending U.S. Patent Application Serial No. 09/819,020 being assigned to the same assignee as the present invention.

Background of the Invention

[0002] The present invention pertains to teleconferencing arrangements and more particularly to conference call bridges in a voice over internet protocol environment.

[0003] Special telephony functions are provided by telephone operating companies or by teleconference facilitator companies. These companies provide the special service of teleconference facilitating by interconnecting three or more conference users in one common telephone call. As a result, each of the users is able to talk and to hear each of the other users. The number of total teleconference users may be quite high. In the internet protocol environment, bandwidths are typically very large compared to basic voice telephony. Voice data becomes almost incidental to the large packets of data carried on the internet. Therefore, voice over internet protocol (VoIP) enables the internet system to carry telephone traffic which typically requires far less data to be exchanged via the internet than does data packages of information.

[0004] Telephone operating companies or teleconference facilitator companies typically implement a teleconference arrangement by a conference bridge. This conference bridge includes a bank of varied codecs, converters, mixers and vocoders. Each particular user has a codec in his teleconference terminal and must be connected with a similar codec at the conference bridge arrangement in the teleconference facilitator's equipment. The conference users may have different and varied codecs, therefore the conference bridge must be capable of serving many different kinds of codec interfaces.

[0005] In typical conference calling arrangements, "long winded" speakers may monopolize the conference call. In other situations one of the conference callers may be speaking from a noisy environment. In such situations that speaker will monopolize the conference since the conference bridge will perceive that speaker as never going silent (stop talking) due to the high level of noise.

[0006] Also, quick detection of silence avoids the real time problems and computing power required to detect silence in conventional conference arrangements.

[0007] What is needed is a token passing arrangement for avoiding a monopolizing speaker or a noisy environment in a conference call bridge in a voice over internet protocol environment.

Brief Description of the Drawing

[0008] FIG. 1 is a block diagram of a conference call bridge arrangement using voice over internet protocol in accordance with the present invention.

[0009] FIGS. 2 and 3 are a flow chart of a call origination and set up in accordance with the present invention.

[0010] FIG. 4 is a flow chart of the token passing arrangement in accordance with the present invention.

[0011] FIG. 5 is a block diagram of the conference bridge in accordance with the present invention.

Description of the Preferred Embodiment

[0012] In providing the present invention, session internet protocol (SIP) is used. SIP provides terminal capability negotiations and invitation to multicast conferences. Further, SIP provides the necessary protocol mechanisms so that the user terminals and any proxy servers can provide the following services: user location, user capabilities, terminal capability negotiation, and invitations to multicast conference.

[0013] FIG. 1 depicts a block diagram of a conference bridge arrangement according to the present invention. User terminals 10, 11, 12 and 13 are shown with data transfer interconnections 20, 21, 22 and 23 respectively connecting user terminals 10-13 to the controller 32 of conference bridge 30. Conference bridge 30 may be a voice packet switched bridge. These data transfer interconnections 20-23 are termed bearer traffic (voice data) interconnections. Similarly, each of the user terminals 10-13 are interconnected to the conference bridge 30 via signaling or control interconnections 44, 54, 64 and 74 respectively.

[0014] In conventional bridge arrangements, all signaling would be controlled by the conference bridge 30 via the signaling leads 44, 54, 64 and 74. As can be seen from FIG. 1, each of the user terminals (teleconference terminals) 10-13 has a different set of codecs 80-83 associated with the user terminal. The conventional conference bridge would be required to convert the data flow from each of the codecs 80-83; mix the information and separately vocode four different codecs before retransmitting the information for the conference call back to each of the user terminals 10-13. Such arrangement requires great processing power within the conference bridge. In an implementation of such a conference bridge, multiple signal processors (DSP) would be required at conference bridge 30 to perform these various functions.

[0015] In the present invention, each use of terminal is also interconnected via a session initiation protocol (SIP) connection to each of the other user terminals in the conference. That is, for example, user terminal 10 is interconnected to user terminal 11 via interconnection 41; to user terminal 12 via interconnection 42, which is shown in a dashed line in part to indicate that there is

no connection to bridge 30 or controller 32, and to user terminal 13 via interconnection 43.

[0016] Similarly, user terminal 11 is interconnected to user terminal 12 via interconnection 52; and to user terminal 13 via interconnection 53, which is shown in a dashed line in part to indicate that there is no connection to bridge 30 or controller 32. User terminal 12 is connected to user terminal 13 via interconnection 63.

[0017] A preferred embodiment of the present invention includes each user terminal 10-14 negotiating with the other user terminals directly via session initiation protocol and the internet to determine what compatible codec the terminals have with one another.

[0018] As an example, user terminal 10 originates the conference call and includes two codecs 80 and 82 while user terminal 11 includes three codecs 81, 82 and 83. As a result, user terminals 10 and 11 will negotiate the use of a codec by each of the terminals via internet interconnection 41. User terminals 10 and 11 may have many or only one codec in common. This particular common codec is codec 82 and will be selected between terminals 10 and 11.

[0019] User terminal 10 then will negotiate with user terminal 12 via internet interconnection 42. User terminal 12 includes only one codec 82. Therefore, the compatible codec of the user terminals 10 and 12 will be selected so that communication may be established between user terminals 10 and 12. This compatible codec is codec 82. If a different codec other than 82 was common between user terminals 10 and 12 this would mean that user terminal 10 must renegotiate use of the codec with user terminal 11 so as to establish a new common codec.

[0020] Similarly, user terminal 10 will negotiate selection of a codec via interconnection 43 with user terminal 13. In this example, user terminal 13 has a successful negotiation with user terminal 13 to codec 82. User terminal will not have to renegotiate the selection of a codec with the other user terminals 11 and 12. Again in this example, selection of an appropriate compatible codec could mean renegotiating the codec interconnections between user terminal 10 and user terminals 11 and 12. In this embodiment, user terminals 10 through 13 negotiate codecs to a "least common denominator" (LCD) codec. That is, a codec which will support communications between any of the user terminals 10-13. In this example, codec 82 met the criteria for LCD codec selection.

[0021] In another embodiment, the conference bridge may be asked to convert, mix and revocode certain data packets transmitted among the conference callers. Those data packets would be limited to those for users which have different codecs than the other users in the conference call. Therefore, this embodiment would support an arrangement in which each user terminal could speak in its native bearer format (codec translation) with the other conference callers. All packets would not have to be converted, mixed and revocoded; only the packets with those special user terminals having nonhomogeneous bearer formats would be required to be thusly processed. This conversion and mixing may be done by one or more of the user terminals instead of the conference bridge.

[0022] The control of setting up the appropriate codecs for interfacing and negotiating to either a least common denominator codec or to codecs which are variable may be extended to add additional parties to the conference call. When each of the callers in the conference call has been suitably negotiated for a corresponding codec, the data flow is then established through the conventional conference bridge 30 to each of the data ports of the user terminals 10-13.

[0023] Referring to FIGs. 2 and 3, a call origination 100 conference call arrangement of FIG 1 is shown. Party A (user terminal 10) is to enter into a conference call, block 101. Party A originates a call via internet interconnection 41 to party B (user terminal 11), block 103. Next, block 105 determines a common bearer format (codec) between parties A and B. A call is then originated to user terminal 12 via internet interconnection 42, block 107.

[0024] Next, block 109 negotiates a bearer format between party A and party C (user terminal 12), block 109. An attempt is made to negotiate the same bearer format (codec) as was negotiated between parties A and C. Block 110 determines whether there are any other user terminals (parties) to be interconnected to the conference call. If there are other parties to be coupled, then block 110 transfers control to block 107 for repeating the processes of blocks 107 and 109 with a new party to be coupled to the conference call. If no other user terminals (parties) are to be coupled to the conference call, then block 110 transfers control to block 111 via the NO path.

[0025] Next, block 111 determines whether the user terminal support multiple interoperable bearer formats. If each of the user terminals supports multiple bearer formats, control is transferred from block 111 to block 121 via the YES path. Block 121 indicates to each of the user terminals that each of the user terminals will transmit and receive in their own native bearer format.

[0026] If each of the user terminals will not support multiple bearer formats, block 111 transfers control to block 113 via the NO path. Block 113 determines whether the bearer formats which were negotiated are homogeneous. If the formats are homogeneous, block 113 transfers control to block 123 via the YES path. This indicates that there is a LCD codec for use by each of the parties. If the negotiated formats are not homogeneous, block 113 transfers control to block 115 via the NO path.

[0027] Block 115 determines whether any common bearer format exists among each of the parties or users. If no common format exists, there is a failure and the conference call bridge may not be set up to all members, block 115 transfers control to block 117 via the NO path. The conference call bridge may continue to set up for a subset of the initial parties or cancel the setup completely, block 117. If a common bearer format exists, block

115 transfers control to block 119 via the YES path. Block 119 modifies A, B, C, etc. bearer formats to obtain a common bearer format between the parties in the conference call. Then block 119 transfers control to block 123.

[0028] Block 123 originates call to conference bridge 30 with all the parties or users being addressed. The conference bridge establishes the data path communications via conference bridge 30 and controller 32, block 125. The bridge for conference calling is then established, block 127.

[0029] In response to the call origination process 100, conference bridge executes, block 125, the following setup procedure, block 141.

[0030] For example, the conference bridge 30 receives the origination request from party A with a list of targets to connect to the conference call of parties B and C, block 143. Block 145 originates the data hook up to parties B and C.

[0031] Conference bridge 30 sends a message to parties A, B and C (user terminals 10, 11 and 12) via internet interconnections 44, 54 and 64 to use the conference bridge as an end point for the voice packet data transmissions, block 147. The conference bridge is then an established block 149 and procedure 140 is ended. The user terminals update their states to reflect that the conference bridge Is now the bearer endpoint, instead of the user terminals. The conference bridge is established and procedure 100 is also ended, block 127.

[0032] Turning now to FIG. 4, a flow chart of a "token" or control passing arrangement is shown. Once the conference bridge is established, control of speech is passed among the users via their user terminals. The real time protocol (RTP) is a protocol used for carrying the bearer traffic, and is associated with the session initiation protocol (SIP). SIP negotiates the kind of bearer/payloads to be transported in the RTP packets. There is a particular indicator in the header of the RTP voice packet which designates the voice packet as a packet with silence. This indicator is readily ascertainable without examining each bit of the voice sample in the packet.

[0033] While in a conference bridge arrangement block 201, the controller of the conference bridge detects if there is speech on any "leg" or input of the conference bridge, block 203. That is, the conference bridge detects the first user terminal to provide a speech or voice input. If no speech input is detected, block 203 transfers control again to make the detection by transferring control to itself via the NO path. Silence is the lack of speech. Silence may be detected by an indicator in the header of the voice packet or by sampling the data of the packet itself. When speech is detected, block 203 will transfer control to block 205 via the YES path.

[0034] Block 205 will disable the other inputs ("legs") of the conference bridge from providing any input to the conference bridge. That is, the first speaker will seize control of the conference and other speakers will be disabled from having their voice transferred to each of the users in the conference call. Only one speaker will speak at a given time.

[0035] The next block 207 initiates a "babble" timer. A babble timer is a timer set to prevent one speaker on the conference call from tying up and monopolizing the conference forever from ("babbling") or if a noisy background causes the user terminal to never generate the silence packets, thereby monopolizing the conference bridge. The intent of the babble timer is to force the passage of control or token passing of the right to speak to another caller in the conference call at a predetermined time. The term "babble" is to prevent one speaker from babbling on forever, to prevent the noisy environment from never allowing silence packets to be generated.

[0036] The next block 209 takes the input voice packet and replicates it for transmission to each of the legs or inputs of the conference call. That is, each caller in the conference call, including the speaker, receives back the voice packets input from the speaking party including the speaking party.

[0037] Next, a determination is made as to whether the "babble" timer has expired, block 211. This indicates that one speaker has monopolized the conference call and it is time to pass the control or token to another speaker in the conference call who may be initiating speech (trying to speak). If the babble timer has expired, block 211 transfers control to block 213 via the YES path. Block 213 enunciates a cut off tone or message to the present speaker so that the speaker will be aware that he is temporarily losing control of the token or control of the conference call. This means that the speaker is being forced to relinquish his ability to speak to the others in the conference call in an uninterrupted fashion.

[0038] Block 215 disables the present speaker's input leg temporarily. This is so that the other input legs may be examined for speech and a determination of passing control or the token to another speaker may be made. Block 215 then transfers control to block 203 which detects bearer speech on an input leg, except for the disabled past speaker's input. If speech is not detected after a predetermined number of times of checking by block 203, the past speaker's input will be re-enabled and he will again be able to seize the token or control of the conference call. The reader is reminded that speech is quite slow compared to today's real time processing capabilities and that the checks made by the conferencing bridge method 200 are done in fractions of a second so that the speaker who is disabled temporarily may not even know that he has been temporarily disabled from speaking. If block 203 detects speech of another speaker, the steps of blocks 205, 207, 209, 211 and 217 are then performed.

[0039] If the babble timer has not expired, block 211 transfers control to block 217 via the NO path. Block 217 detects silence. Silence in a real time protocol SIP configuration is indicated by a particular setting in the header of each packet of speech information. Also, silence may be detected by examining the actual input stream

which would be coded to indicate silence. The latter solution requires considerable real time processing power. If silence is detected, block 217 transfers control to block 203 via the NO path which indicates that the past speaker has relinquished the token and the conference bridge is waiting to detect a new speaker by block 203. When this happens, each of the above mentioned steps is again repeated. If silence is not detected, block 217 transfers control to block 209 which replicates the input packet to all the output legs (user terminals) of the conference call. This means that the present speaker has not relinquished control and the timer has not indicated to him to release control and he is continuing to talk with his voice packets of information being distributed to each of the conference callers including himself.

[0040] In the token or control passing arrangement 200, token control is simplified by examining the header of the real time protocol to determine a data packet of silence in the preferred embodiment. This greatly simplifies the processing capability required for the conference call and such conferencing circuitry may be employed in a user terminal or even in a mobile handset. In an alternate embodiment, each data packet may be examined for the voice coded silence (as well as moise detection to determine "babble" or a noisy environment). This embodiment requires considerably more real time processing power.

[0041] FIG. 5 depicts a block diagram of the conference bridge 30. Hardware 310 includes a processor 311 interconnected with memory 312 and internet protocol based interface 313. Memory 312 is also interconnected with IP based interface 313. IP based interface 313 provides the bearer traffic and control signaling inputs and outputs mentioned above.

[0042] The software 320 of the conference bridge includes SIP user agent server 321 which is interconnected to packet replicator 322. Packet replicator 322 is interconnected with the token passing control logic 323 which is shown in FIG. 4. The SIP user agent server software 321 is depicted in FIGs. 1-3 discussed above. Packet replicator 322 is believed well known in the art and will not be discussed further. Token passing control logic 323 was previously described in FIG. 4. These various functions interact as discussed above to provide the conference bridge arrangement of the present invention.

[0043] New wire line cable and DSL infrastructure is being positioned to support voice along with data. In addition, third generation mobile networks are currently being developed. Much of the new infrastructures use internet protocol technology which enables voice over internet protocol services to be supplied. The present invention leverages off of session initiation protocol applicable to such voice over internet protocol capabilities to provide a conference bridge in accordance with the above description. The present invention simplifies the way in which conference calling can work in a voice over internet protocol environment. The present conference bridge arrangement allows negotiation of codecs directly between each of the participants in a conference call. This negotiation occurs over the internet which allows each user to be found regardless of whether he is at his typical location or is in a mobile location. This eliminates the need for complex conversions and vocoding to occur at the central conference bridge. The conference bridge is greatly simplified to be a basically packet replicator and distributor. This greatly simplifies the requirements for conference bridges located within telephone operating companies or conference facilitator providers.

[0044] The conference bridge is removed from handling the set up of the conference call and handles just the transmission of bearer traffic between the conference call participants. Conventional conference arrangements require the conference bridge to include virtually every conceivable codec for information interchange among varied users. In addition, the conference bridge needs to include much processing power in the form of digital signal processors to implement conversion, mixing and revocoding functions required. The present invention eliminates all such functional requirements in the conference bridge by having the user terminals themselves negotiate a compatible codec (bearer format) with the other user terminals in the conference call. Suitably equipped user terminals including remote terminals may perform the conference bridge function directly.

[0045] The token control arrangement leverages off of the real time protocol (RTP) to quickly detect silence for passing the token to another caller in the conference. In addition, the token passing arrangement allows for cutting off the speaker who is monopolizing the conference call. The control for such token passing arrangements may reside even in the user terminal of one of the conference callers.

[0046] Although the preferred embodiment of the invention has been illustrated, and that form described in detail, it will be readily apparent to those skilled in the art that various modifications may be made therein without departing from the spirit of the present invention or from the scope of the appended claims.

Claims

1. A token control method for an internet conference call among a plurality of user terminals, the token control method comprising the steps of:

   detecting (203) bearer traffic from a first user terminal of the plurality of user terminals;
   detecting (217) silence from a real time protocol of data packets being transmitted by the first user terminal of the plurality of user terminals; and
   if the step of detecting silence is successful, detecting (203) bearer traffic from the real time

protocol of a second user terminal of the plurality of user terminals.

2. The token control method as claimed in claim 1, wherein there is further included a step of establishing (321) the internet conference call via a session initiation protocol over an internet.

3. The token control method as claimed in claim 1, wherein the step of detecting silence includes the step of detecting (217) an indication of silence from a header of at least one of the data packets in real time protocol.

4. The token control method as claimed in claim 3, wherein if the step of detecting silence is successful, there is further included the step of detecting (203) bearer traffic from the real time protocol of a second of the plurality of user terminals.

5. The token control method as claimed in claim 1, wherein the step of detecting silence includes the step of examining (323) data of the data packets for an indication of silence.

6. The token control method as claimed in claim 5, wherein if the step of detecting silence is successful, there is further included the step of detecting (323) bearer traffic from the real time protocol of a second of the plurality of user terminals.

7. The token control method as claimed in claim 1, wherein there is further included the step of disabling (205) an input of each of another of the plurality of user terminals when bearer traffic is detected from the first user terminal of the plurality of user terminals.

8. The token control method as claimed in claim 1, wherein there is further included the step of starting (207) a timer for the first user terminal to measure a length of time the first user terminal continuously speaks.

9. The token control method as claimed in claim 1, wherein there is further included the step of replicating (209, 322) the data packets of the first user terminal for transmission to each of the plurality of user terminals.

10. The token control method as claimed in claim 1, wherein there is further included the step of replicating (322) the data packets of the first user terminal for transmission to each of the plurality of user terminals, if silence is not detected.

11. The token control method as claimed in claim 8, wherein there is further included the step of examining (211) the timer for determining whether the length of time has exceeded a predetermined length of time for continuous speaking by the first user terminal.

12. The token control method as claimed in claim 11, wherein there is further included the step of annunciating (213) a cut-off tone to said first user terminal, if the timer exceeded its predetermined length of time.

13. The token control method as claimed in claim 11, wherein there is further included the step of temporarily disabling (215) an input of said first user terminal, if the timer exceeded its predetermined length of time.

14. The token control method as claimed in claim 13, wherein there is further included the steps of:

detecting (203) bearer traffic from the real time protocol of the second user terminal of the plurality of user terminals; and
enabling (205) the input of the first user terminal.

15. The token control method as claimed in claim 14, wherein there is further included the step of iterating the steps of: detecting (203) bearer traffic; detecting silence from a real time protocol of data packets; and if the step of detecting (217) silence is successful, detecting (203) bearer traffic for the second user terminal.

16. The token control method as claimed in claim 14, wherein there is further included the step of replicating (209) the data packets of the second user terminal for transmission to each of the plurality of user terminals.

17. In a mobile user terminal a token control method for an internet conference call among a plurality of user terminals, the token control method comprising the steps of:

detecting (203) bearer traffic transmitted by a first mobile user terminal of the plurality of user terminals;
detecting (217) silence from a real time protocol of data packets being transmitted by the first mobile user terminal; and
if the step of detecting silence is successful, detecting (203) bearer traffic from the real time protocol of a second mobile user terminal by the first mobile user terminal.

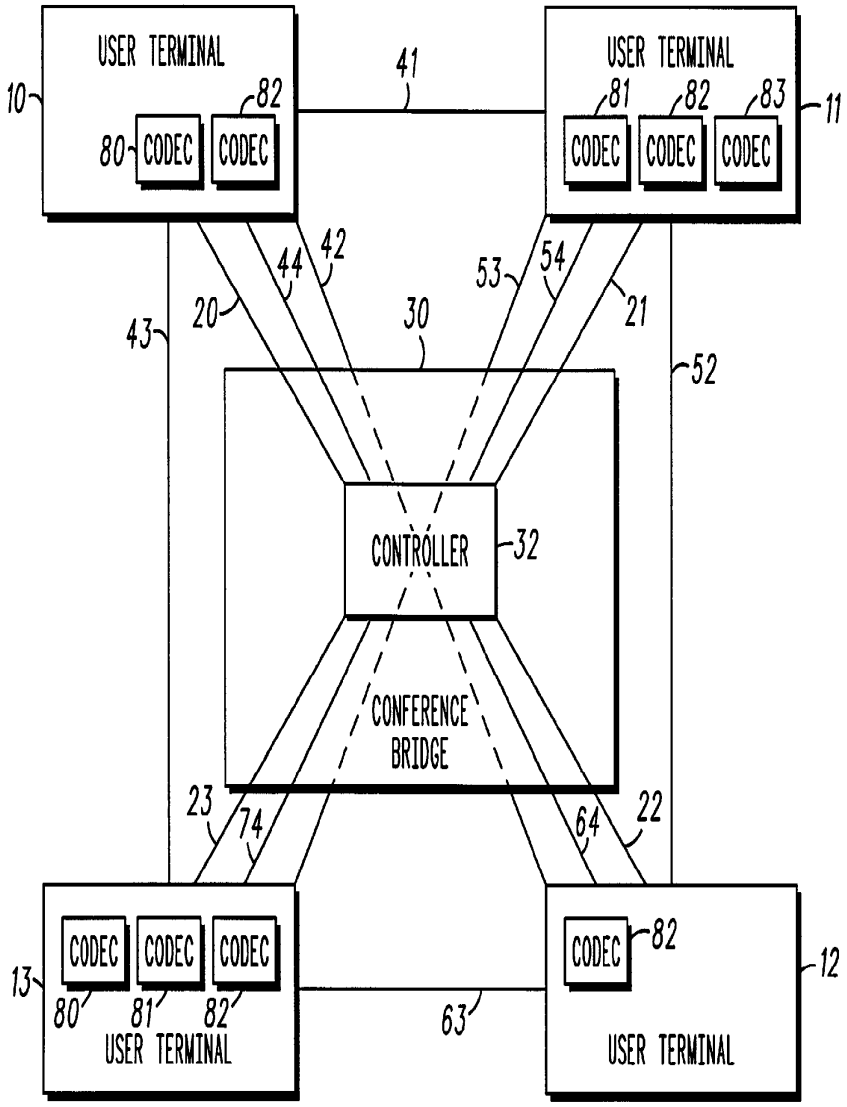
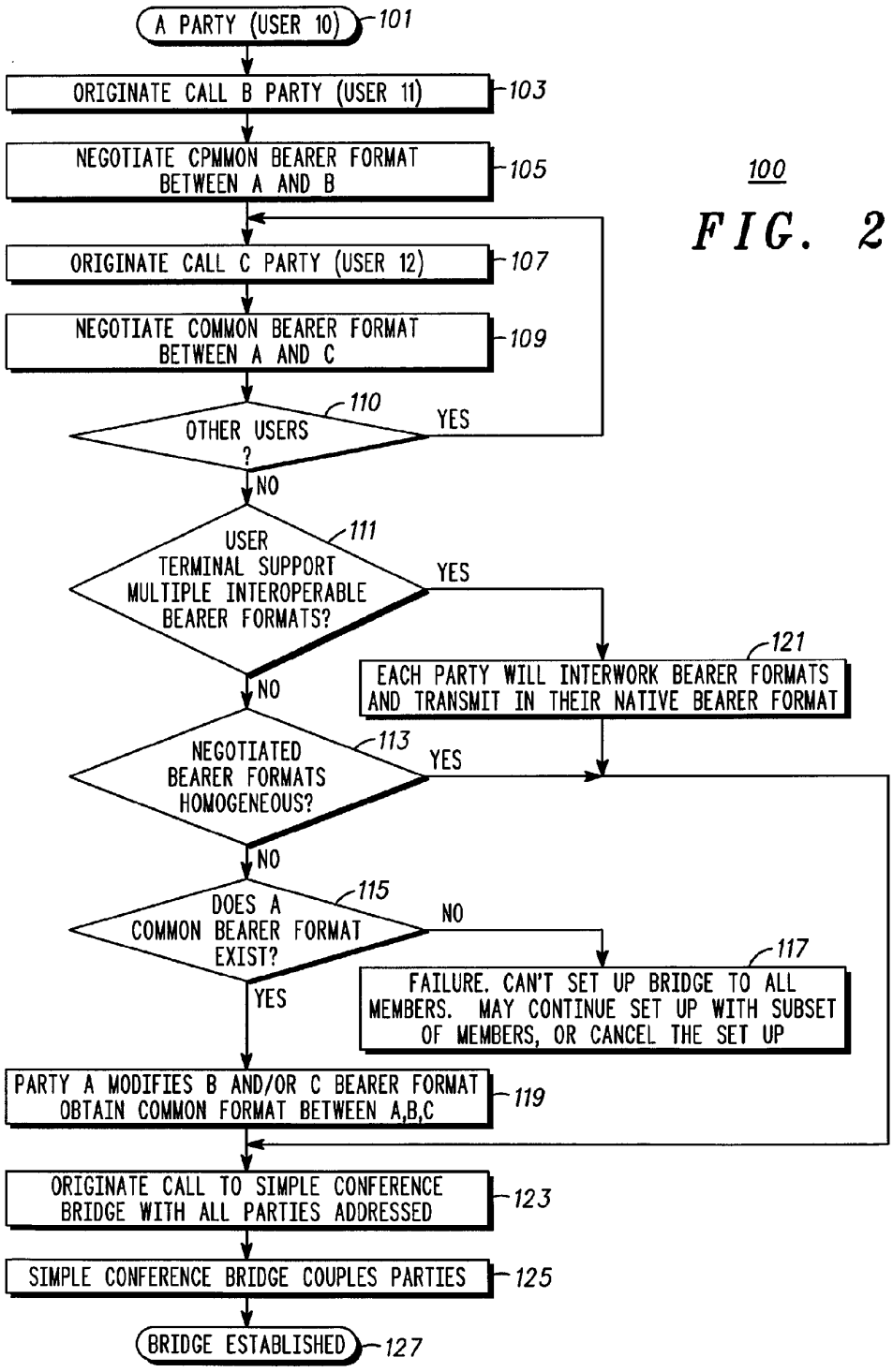

USER TERMINAL
10
82
80
CODEC
CODEC
41
USER TERMINAL
81
82
83
11
CODEC
CODEC
CODEC
42
44
53
54
20
43
30
21
52
CONTROLLER
32
CONFERENCE
BRIDGE
23
74
64
22
CODEC
CODEC
CODEC
13
80
81
82
USER TERMINAL
63
CODEC
82
12
USER TERMINAL

FIG. 1


A PARTY (USER 10)
101
ORIGINATE CALL B PARTY (USER 11)
103
NEGOTIATE CPMMON BEARER FORMAT BETWEEN A AND B
105
ORIGINATE CALL C PARTY (USER 12)
107
NEGOTIATE COMMON BEARER FORMAT BETWEEN A AND C
109
OTHER USERS ?
110
YES
NO
USER TERMINAL SUPPORT MULTIPLE INTEROPERABLE BEARER FORMATS?
111
YES
NO
EACH PARTY WILL INTERWORK BEARER FORMATS AND TRANSMIT IN THEIR NATIVE BEARER FORMAT
121
NEGOTIATED BEARER FORMATS HOMOGENEOUS?
113
YES
NO
DOES A COMMON BEARER FORMAT EXIST?
115
NO
YES
FAILURE. CAN'T SET UP BRIDGE TO ALL MEMBERS. MAY CONTINUE SET UP WITH SUBSET OF MEMBERS, OR CANCEL THE SET UP
117
PARTY A MODIFIES B AND/OR C BEARER FORMAT OBTAIN COMMON FORMAT BETWEEN A,B,C
119
ORIGINATE CALL TO SIMPLE CONFERENCE BRIDGE WITH ALL PARTIES ADDRESSED
123
SIMPLE CONFERENCE BRIDGE COUPLES PARTIES
125
BRIDGE ESTABLISHED
127

100

FIG. 2

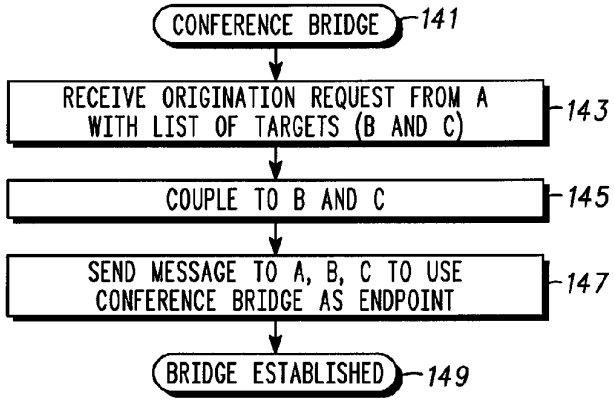

CONFERENCE BRIDGE
141
RECEIVE ORIGINATION REQUEST FROM A WITH LIST OF TARGETS (B AND C)
143
COUPLE TO B AND C
145
SEND MESSAGE TO A, B, C TO USE CONFERENCE BRIDGE AS ENDPOINT
147
BRIDGE ESTABLISHED
149
140

FIG. 3

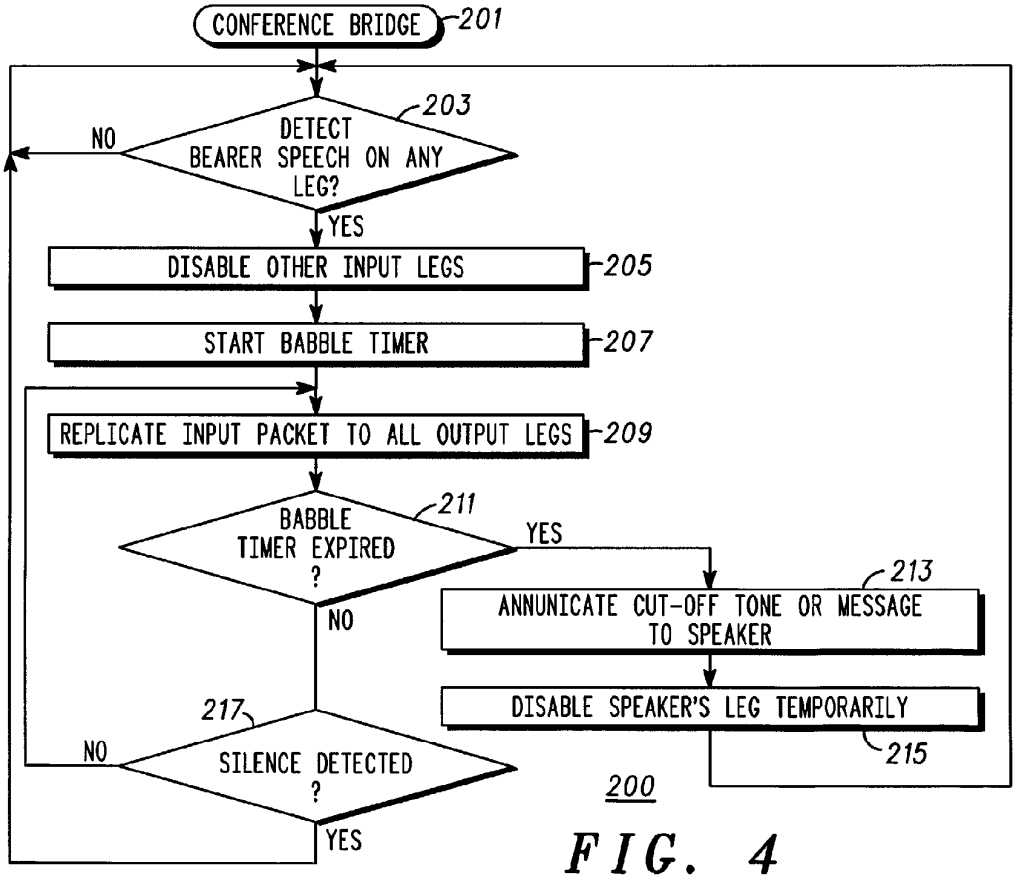

CONFERENCE BRIDGE
201
DETECT BEARER SPEECH ON ANY LEG?
203
NO
YES
DISABLE OTHER INPUT LEGS
205
START BABBLE TIMER
207
REPLICATE INPUT PACKET TO ALL OUTPUT LEGS
209
BABBLE TIMER EXPIRED ?
211
YES
NO
ANNUNICATE CUT-OFF TONE OR MESSAGE TO SPEAKER
213
DISABLE SPEAKER'S LEG TEMPORARILY
215
SILENCE DETECTED ?
217
NO
YES
200

FIG. 4

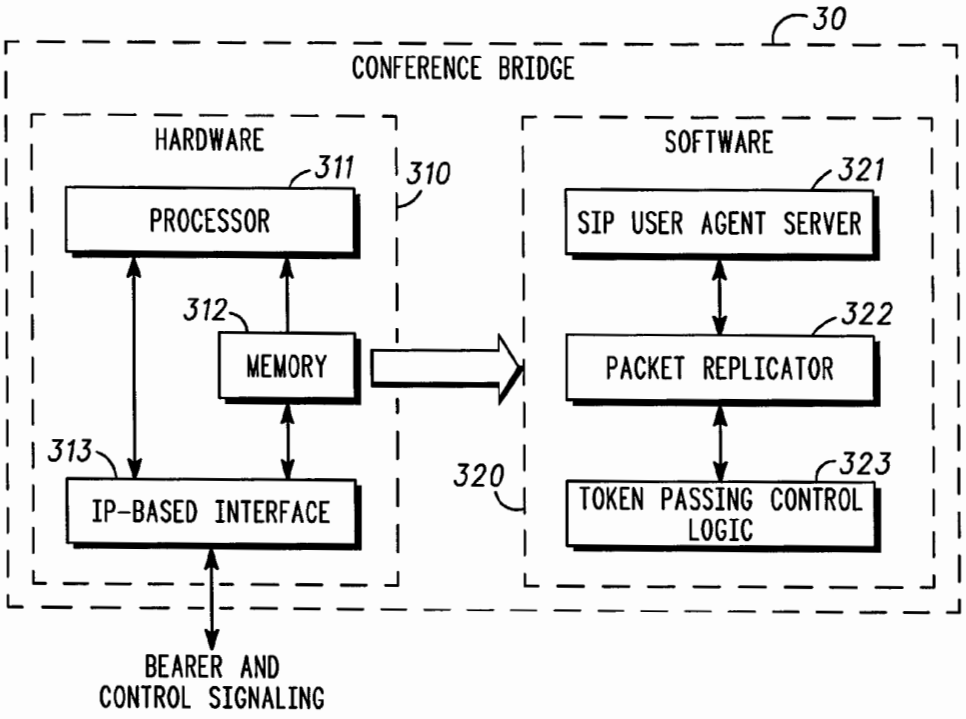

30
CONFERENCE BRIDGE
HARDWARE
311
310
PROCESSOR
312
MEMORY
313
IP-BASED INTERFACE
SOFTWARE
321
SIP USER AGENT SERVER
322
PACKET REPLICATOR
320
323
TOKEN PASSING CONTROL LOGIC
BEARER AND CONTROL SIGNALING

FIG. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 00 2956

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 6 175 871 B1 (SIDHU IKHLAQ S ET AL) 16 January 2001 (2001-01-16) * abstract * * column 8, line 35 - line 50 * * column 9, line 14 - line 20 * * column 13, line 50 - line 59 *	1-7,9, 10,17	H04L12/18 H04L29/06 H04M3/56
Y		8,11-16	
X	EP 0 779 732 A (ONLIVEO TECHNOLOGIES INC) 18 June 1997 (1997-06-18) * abstract * * page 7, line 24 - line 29 * * page 8, line 25 - line 32 *	1-7,9, 10,17	
Y	US 6 009 469 A (HUTTON GLENN W ET AL) 28 December 1999 (1999-12-28) * abstract * * column 8, line 41 - line 50 *	8,11-16	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H04L
H04M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	15 July 2002	Hilbig, S

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 00 2956

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6175871 B1	16-01-2001	AU 1064099 A	23-04-1999
		WO 9917584 A2	08-04-1999
		US 6366959 B1	02-04-2002
EP 0779732 A	18-06-1997	EP 0779732 A2	18-06-1997
		JP 9204200 A	05-08-1997
US 6009469 A	28-12-1999	US 6108704 A	22-08-2000
		AU 727702 B2	21-12-2000
		AU 7247696 A	30-04-1997
		BR 9610980 A	15-06-1999
		CA 2231127 A1	17-04-1997
		CN 1197567 A	28-10-1998
		EP 0852868 A2	15-07-1998
		JP 11515148 T	21-12-1999
		WO 9714234 A2	17-04-1997
		US 6131121 A	10-10-2000
		US 6185184 B1	06-02-2001
		US 6275490 B1	14-08-2001

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Published

With international search report.

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(54) Title: MULTIPARTY CONFERENCING AND COLLABORATION SYSTEM

(57) Abstract

A networking conferencing and collaboration tool utilizing an enhanced T.128 application sharing protocol. This enhanced protocol is based on a per-host model command, control, and communication structure. This per-host model reduces network traffic, allows greater scalability through dynamic system resource allocation, allows a single host to establish and maintain a share session with no other members present, and supports true color graphics. The per-host model allows private communication between the host and a remote with periodic broadcasts of updates by the host to the entire share group. This per-host model also allows the host to allow, revoke, pause, and invite control of the shared applications. Subsequent passing of control is provided, also with the hosts acceptance. The model contains no fixed limit on the number of participants, and dynamically allocates resources when needed to share or control a shared application. These resources are then freed when no longer needed. Calculation of minimum capabilities is conducted by the host as the membership of the share changes. The host then transmits these requirements to the share group.

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MULTIPARTY CONFERENCING AND COLLABORATION SYSTEM

Field Of The Invention

The instant invention relates to Internet and intranet multiparty conferencing and collaboration tools, and more particularly to a multiparty conferencing and collaboration tool utilizing a per-host model command, control, and communication structure which also provides pre-meeting establishment and post-meeting maintenance of application sharing by a single user.

Background Of The Invention

Real time communication is vital to the success of any business. As businesses continue to grow and develop outside the typical four walls of an office or factory, with multiple divisions located around the country and around the world, with an increasing number of employees telecommuting, and even with employees located in different distant parts of the same building, tools facilitating real time communication are becoming essential, not just for businesses to succeed, but also for businesses to simply survive. While the widespread use of local area networks (LANs), wide area networks (WANs), and e-mail has increased the productivity of many companies and individuals, such structures and tools do not provide, by themselves, the ability for real time group collaboration so essential for the success of work groups and design teams which, in turn, drives the success of businesses.

In recognition of the changing way businesses need to function to survive and prosper in this distributed environment of the world-wide workplace, the assignee of the instant invention developed and released a network conferencing and collaboration tool called NetMeeting™ 2.0. This tool provides H.323 standards-based voice and video conferencing, T.120 multipoint data conferencing including application sharing, clipboard sharing,

file transfer, whiteboard, and chat features. Application sharing is a feature of NetMeeting™ that allows a person in a conference running an application locally with local data (like Notepad™) to send the graphics of the application to the other people in the conference. The remote people see what the local person does, the title bar, the client area, obscured areas, etc. The remotes can even control the shared application, the remote person in control's keyboard and mouse drive the keyboard and mouse of the person sharing the application. This results in appearance changes, like opening a new file would, and those will be transmitted back from the sharer to the others.

These features were immediately successful in aiding the real time communication and design activity of many businesses. As companies became more and more familiar with the advantages available through such a tool, their demand for increased usage of and capabilities from such a tool exceeded even the expectations of the assignee. However, at the same time that users were demanding increased usage, they were also demanding increased control, new features, and reduced network resource and time utilization from this tool.

One of the most desired feature enhancements of this tool was to increase the number of simultaneous users who could participate in an on-line conference. However, a 16-bit version of the application sharing code, NetMeeting™ 2.0, was built on the Win 9x platform which is interrupt based for mouse and keyboard inputs. As such, and because it was based off Win3.x technology, this platform required the up-front allocation of system memory for all users. This up-front allocation of system resources required that all resources which might ever be need by the users were allocated. This was quite wasteful since a good portion of the allocated resources needed for application sharing were allocated to many users who would never share or collaborate, and were only in the meeting to view. This could total three megabytes for each user, to represent their desktop and create the required object caches. Because of this memory allocation requirement and based on estimated typical system user resources, a maximum hard limit of 32 users

was set in the system. While this was believed to be adequate for most meetings, the demand for more attendees based on the ease of communication flow soon pushed the limit beyond that which the system would allow.

Another problem which became apparent as the number of meeting participants grew relates to the network traffic generated between participants under the T.128 application sharing protocol. With increasing numbers of participants in a meeting, the number of message packets sent between these participants during operation and when a new person wanted to join the meeting increased to a point where the delay in communication and interruption of the meeting became excessive. In addition to the number of messages which were sent, the computational algorithms used were complex, adding proportionally to the amount of time needed for anything to happen. Depending on the particular connections between participants, e.g. the Internet, the delay in the meeting resulting from a new person joining could extend into the several minutes range. With this type of delay, people hang-up, lose their Internet connection, lose interest, etc.

The T.128 model utilized in this NetMeeting™ system was a global free-for-all model where all members were peers. Every person in the conference would maintain a global list, ordered from front to back of all of the shared applications of everybody in the conference, merged completely together. Each person had to be in lock-step with the others, so that the positions, order, and appearance of all shared applications were in sync. Any change in order, state, or position had to be transmitted to everyone in the meeting. This would frequently cause a Ping-Pong effect whereby the new global list would be sent, someone in the conference would decide it was out of date because their shared application had moved, and would transmit a new window list, and so forth. This problem was exacerbated by the collaboration model which also required that all members of the conference periodically broadcast his or her mouse position. This additional network traffic was necessitated by the toggle during collaboration whereby only one of the collaborators controlled all of the collaborators' mice and keyboards.

Therefore, the host would periodically need to check where everyone's cursor is positioned.

As a result of this global, chaotic model, the total network traffic could become excessive due to the amount of this circular traffic, even from members not sharing anything. All of the packets of information were broadcast, with one copy for each member of the conference. The delays resulting from this excessive network traffic caused cursor movements, especially when in control of a remote member's application, to be extremely jerky. This made it almost impossible to control a remote's application with any degree of confidence that the remote user's mouse was really where the controlling member thought it was. Further, under this model no one could do anything until all members were up to date, which further slowed the conference response time. In addition to the network traffic described above, to interpret data from a host, e.g. the drawings of an application, all members in the conference had to know about and interpret the capabilities of all other members of the conference. This drove the network traffic volume even higher, and slowed the system response still further.

Another problem which became apparent from the global collaboration model of NetMeeting™ 2.0 as the number of members in a conference grew was the control of applications which were being shared. This control/collaboration model in the T.128 application sharing protocol of NetMeeting™ 2.0 was global. Each member of the conference could start/stop collaborating. Exactly one of the members collaborating was considered to be in control. Her mouse/keyboard drove the mice and keyboards of the other members collaborating. Those other members were controlled, and their mice and keyboards were locked. However, if they were not sharing anything, the mouse and keyboard input from the person in control would go to nowhere, since the remote users were only allowed to control shared applications, and not unshared ones. This appeared to lock their mice and keyboards for no reason, which was very frustrating especially in the multitasking world of Windows™.

Additionally, anyone collaborating could become the person in control by a simple action such as a mouse click or key press. If several people took control around the same time, the last person to do so won, until the next person took control. There was no organization or order to the passing of control, it was a chaotic model. The users of the system soon termed this chaotic operation as "mouse wars." With a decent number of people in a conference, the telephone was the only way to keep things from getting out of hand. There was a lot of "OK, I am going to take control now, do not do anything anybody" discussion back and forth. Further, collaboration was a two-way street. A person might only want to control another's applications without exposing his own applications to another's control. Unfortunately, that was not possible in this model. Collaboration was all or nothing. Additionally, there was no way for a person to gracefully decline a control operation or even know that it was about to happen. Control would be yanked away without warning.

This global, chaotic collaboration model also added to the excessive network traffic described above. Each control change required some retransmitting of input state information, especially toggle keys, and discarding old accumulated input. The person in control broadcasted his input messages to everyone. All of the members collaborating played back these input messages, skipping ones that obviously would manipulate non-shared windows, and then if they ended up going to a window not shared, swallowed them at the last minute. That allowed the cursor to move, but the actual movement of the mouse notification to not get sent to the windows under the mouse if they are not shared. Further, there was required a lot of complicated token/sequence number/guessing/time stamp calculations performed to figure out who has control if several people try to take control at once, or if it is taking too long to hear back.

A further problem identified relates to the initiation of an application share for a conference. The T.128 protocol utilized in NetMeeting™ 2.0 requires two people to be in a conference before anybody could share an

application. This requirement also meant that if the second-to-last person left the conference, sharing would stop if it were ongoing. This requirement existed because starting up application sharing was a call-response process. The person wanting to share an application would broadcast an "is it ok" packet, and then wait for a response saying "sure, go ahead" before beginning the share. This turned out to be a much worse than is may have first appeared. Users wanted to be able to organize a meeting whereby they could be the only person in the meeting for a while to allow them to set up attributes, applications, and files prior to having others join the meeting. Without this capability, much time is wasted by the other meeting participants while the host completes these activities with them present.

An additional problem relates to the prior T.128 protocol for NetMeeting™ having a limit of 256 colors, 8 bits per pixel (bpp). If a user shared applications on a screen that was running at a greater color depth than 256, information would be lost. The graphics would be constrained and colors would be mapped to the closest equivalent in a 256 color palette. Simple applications did not experience much of a problem, since not many applications make full use of the available colors. The system colors and other common ones are always available. However, a high end bitmap or a web page with photos, for example, would not look good when shared. They would look posterized on the remote users' monitors.

Summary Of The Invention

In view of the above identified and other problems existing in the art, the inventive concepts and teachings of the instant invention involve the application sharing protocol otherwise known as T.128, as preferably implemented in NetMeeting™ 3.0. These protocol changes are the result of a shift from a global collaboration model of prior versions of NetMeeting™ to the "per-host model" of NetMeeting™ 3.0 and later versions. The implementation of the per-host model vastly increases the functionality and ease of use of network conferencing tools by reducing network traffic,

allowing greater scalability, providing better control and collaboration among users, allowing solitary members to begin a share without the necessity of a second or subsequent party, and supporting true color graphics.

By implementing a per-host model whereby communication with and control of the host takes place in a private fashion between the host and a remote with periodic broadcast updates by the host to the entire share group, the total number of network messages which are required to be transmitted between the members of the share group are greatly reduced. To contrast this per-host model, the prior versions of NetMeeting utilized a global model where each person in the conference would maintain a global list, ordering front to back, of all the shared applications of everybody in the conference, merged completely together. This resulted not only in a large number of messages being initially required to maintain the members of the conference in lockstep, but also had a ripple effect whereby each adjustment resulting from the reception of such a message would essentially be echoed back in a broadcast global fashion since a change had now occurred on that user's system.

In the per-host model, the network traffic almost always originates from the host only as opposed to being globally transmitted by each of the members of the conference. While multiple members of the conference may share an application, this per-host model allows each of those members who are sharing to act like a miniature server for the conference, i.e. a host of that shared application. Updates, therefore, instead of being globally transmitted by all members of the conference, simply now stream down from the host. This requires only that the members of the conference need the capabilities of that particular host. A performance improvement is particularly noticeable in the per-host model when a member of the conference is in control of the host. In the per-host model the controlling member transmits its keyboard and mouse move messages privately to the host who then periodically broadcasts the current cursor position to all members of the conference.

Industry performance data has indicated that a reduction in network

traffic of about 25% in a 5 person conference with one person sharing. This reduction increases as the number of people sharing increases, and as the number of people in the conference increases. The reduction in network traffic when someone is controlling the shared applications of another is approximately 50% or more. This reduction could be increased, however it was decided instead to increase the fidelity of the mouse moves to allow finer movements, etc. for better responsiveness. This means that many more mouse move packets are sent than prior versions to allow for this better performance. The reduction in network traffic to add a new person to the conference is approximately 90% or more when the number of existing people is 20 or greater. This reduction is truly an unexpected result which was originally met with skepticism from industry experts until confirmed with actual measurments.

At a detailed level, the following packet changes are implemented for NetMeeting™ 3.0: fewer and smaller Shared Window Lists (SWL) broadcast packets; fewer Active Window Coordinator (AWC) broadcast packets; fewer cursor broadcast packets; fewer Host Entity Tracker (HET) broadcast packets; fewer Synchronizing New Individuals (SNI) broadcast packets; fewer control arbitration (CA) packets; new control (CA30) packets; and fewer Input Manager (IM) packets. These revised and new packets, and the way that they are shared when a new member joins the conference, result in a significant reduction in traffic during application sharing just to get everyone in synchronism with the sharing application.

A further embodiment of the instant invention includes a new collaboration/control model for the application sharing protocol T.128 as implemented in the per-host model of NetMeeting™ 3.0. In the new T.128 application sharing protocol, the control/ collaboration model is per-host. As such, the host is in control not only of her shared application, but also of when and to whom control is relinquished. This allows a host to share an application without worrying about inadvertently losing control of her shared application, and also allows a host to take control of another host without

requiring that she give up control of her shared applications. This ability to designate a host's controllable status as well as the granting or denying of control to a member is effectuated through a simple process. Under this process a host may indicate that her applications are not controllable, in which case she has full control of her shared applications without further interaction or requirement on her part. Alternatively, the host may, at any time during the share, designate an application as being controllable, in which case control of her shared application may be passed to another member of the share. In this state the host may decide to pass control by her own initiation to another member of the share by offering control to that member. In this type of situation, the host invites a remote to assume control of the shared application at which point the remote then has the option to accept control or decline the offer. Until the remote has either accepted or declined the invitation to assume control of the shared application, the host has the power to revoke the invitation.

In addition to the host initiated invitation to assume control of the shared application, a remote may also request permission from the host to take control of her shared application. Under this condition the remote sends a request to assume control to the host who then has the option to either accept or decline the request for assumption of control. As with the invitation to assume control, the remote who has initiated the request has the power to cancel the request at any time prior to the host's acceptance or declination of granting control. Further, to ensure that requests and invitations do not go unanswered, the system also includes a time out function whereby a request or an invitation is only valid for a certain period of time after which the request or invitation is automatically declined. At any point during the remote control of the host's shared application, the host has the power to immediately terminate the remote's control. Further, the host also has the less intrusive option of simply pausing the remote's control temporarily while still maintaining that remote in actual control of the shared application. Once the host unpauses the control the remote then is able to pick up where she left off.

The control may also be passed from one remote to another in this preferred embodiment. However the per-host model ensures that the host of the shared application agree with the passing of control to a subsequent remote before actual control is passed to that remote. If the passing of control to a subsequent remote is agreeable with the host, control is passed to that subsequent remote. If the host disagrees with the subsequent passing of control to the subsequent remote, control stays with the initial remote user. As with requesting or inviting control from a host, a similar mechanism is utilized at the remote level for requesting or inviting control. However, the ultimate decision maker for the shared application control is the host who initiated the share.

In a preferred embodiment of the instant invention, the memory allocated to each member of the conference is now set dynamically such that each member is given a minimum allocation of memory which may be adjusted once that member begins to share. Further, since the memory allocation is now dynamic, the necessity for placing a maximum limit on the number of users of a conference is no longer required. Therefore, the system of the instant invention allows as many members in a conference as may be supported by the meeting or conference host's memory availability. As new members join a conference or as old members leave a conference, memory is dynamically allocated to or freed from that member without significant disruption to the overall operation of the system.

The new T.128 protocol of the instant invention also preferably allows a one person conference by not waiting for a response to the broadcast "is it okay" packet sent to establish a share. Instead, the new T.128 protocol assumes that sharing has succeeded if the person sharing is also the host of the meeting. This mechanism also resolves any conflict resolution problem by always working in favor of the meeting or conference host should two people attempt to share the first thing at about the same time. Further, the conflict resolution works in favor of the more senior conference or meeting member (the one who joined the meeting or conference earlier than the other) should

the conflict not involve the meeting or conference host.

Additionally, a preferred embodiment of the instant invention utilizes the new T.128 protocol to support true color application sharing in a 24 bits per pixel, non-palettized, standard interchangeable format that maps directly to the video hardware. However, while 24 bits per pixel true color is supported, it will only be sent if everyone in the conference has the capability to view it and everybody has a 24 bpp or greater display. If not everyone has a 24 bpp or greater display, the information will not be accurately displayed on their machine and, since such true color support generates a lot more data, there is no need to send such high quality video information if it cannot be viewed accurately anyway. This additional data does not affect performance much if applications such as NotePad™ are being shared. However, if a graphically intensive application is shared there may be significant performance impact. This is because a fixed amount of memory is devoted to the cached bitmaps, and the 24 bpp bitmaps are three times the size of an 8 bpp bitmap. Therefore, only one-third as many fit in the cache. This results in fewer cache hits which then necessitates the sending of bitmap bits more often. Further, since application sharing has a maximum uncompressed packet size of 32,000 bytes, it holds less true color screen data or true color bitmap cache orders, resulting in the requirement for sending more packets for the same area painted.

These and other features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

Brief Description Of The Drawings

FIG. 1 is a simplified block diagram illustrating an exemplary operating environment suitable for application of the instant invention; and

FIGs. 2a-c graphically illustrate in simplified bar chart form the dynamic memory allocation of an embodiment of the instant invention.

While the invention is susceptible of various modifications and

alternative constructions, certain illustrative embodiments thereof have been shown in the drawings and will be described below in detail. It should be understood, however, that there is no intention to limit the invention to the specific forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions and equivalents falling within the spirit and scope of the invention as defined by the appended claims.

Detailed Description Of The Preferred Embodiment

FIG. 1 in the following discussion are intended to provide a brief, general description of a suitable computing environment in which the invention may be implemented. Although not required, the invention will be described in the general context of computer-executable instructions, such as program modules, being executed by a personal computer. Generally, program modules include routines, programs, objects, components, data structures, etc. that perform particular tasks or implement particular abstract data types. Moreover, those skilled in the art will appreciate that the invention may be practiced with other computer system configurations, including hand-held devices, microprocessor systems, microprocessor-based or programmable computer electronics, network PCs, minicomputers, mainframe computers, and the like. The invention may also be practiced and distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

With reference to FIG. 1, an exemplary system for implementing the invention includes a general purposed computing device in the form of a conventional personal computer 20, including a processing unit 21, a system memory 22, and a system bus 23 that couples various system components including the system memory to the processing unit 21. The system bus 23 may be any of several types of bus structures including a memory bus or memory controller, a peripheral bus, and a local bus using any of a variety of

bus architectures. The system memory includes read-only memory (ROM) 24 and random access memory (RAM) 25. A basic input/output system 26 (BIOS), containing the basic routines that help to transfer information between elements within the personal computer 20, such as during startup, is stored in ROM 24. The personal computer 20 further includes a hard disk drive 27 for reading from and writing to a hard disk, not shown, a magnetic disk drive 28 for reading from or writing to a removable magnetic disk 29, and an optical disk drive 30 for reading from or writing to a removable optical disk 31 such as a CD ROM or other optical media. The hard disk drive 27, magnetic disk drive 28, and optical disk drive 30 are connected to the system bus 23 by a hard disk drive interface 32, a magnetic disk drive interface 33, and an optical drive interface 34, respectively. The drives and their associated computer-readable media provide nonvolatile storage of computer readable instructions, data structures, program modules and other date for the personal computer 20. Although the exemplary environment described herein employs a hard disk, a removable magnetic disk 29 and a removable optical disk 31, it should be appreciated by those skilled in the art that other types of computer readable media which can store data that is accessible by the computer, such as magnetic cassettes, flash memory cards, digital video disks, Bernoulli cartridges, random access memories (RAMs), read-only memories (ROMs), and the like, may also be used in the exemplary operating environment.

A number of program modules may be stored on the hard disk, magnetic disk 29, optical disk 31, ROM 24, or RAM 25, including an operating system 35, one or more application programs 36, other program modules 37, and program data 38. A user may enter commands and information into the personal computer 20 through input devices such as a keyboard 40 and a pointing device 42. Other input devices (not shown) may include a microphone, joystick, game pad, satellite dish, scanner, or the like. These and other input devices are often connected to the processing unit 21 through a serial port interface 46 that is coupled to the system bus, but may be connected by other interfaces, such as a parallel port, game port, or a universal

serial bus (USB). A monitor 47 or other type of display device is also connected to the system busy 23 via an interface, such as a video adapter 48. In addition to the monitor, personal computers typical include other peripheral output devices (not shown), such as speakers and printers.

The personal computer 20 may operate in a networked environment using logical connections to one or more remote computers, such as a remote computer 49. The remote computer 49 may be another personal computer, a server, a router, a network PC, a peer device, or other common network node, and typically includes many or all of the elements described above relative to the personal computer 20, although only a memory storage device 50 has been illustrated in FIG. 1. The logical connections depicted in FIG. 1 include a local area network (LAN) 51 and a wide area network (WAN) 52. Such networking environments are commonplace in offices, enterprise-wide computer networks, intranets, and the Internet.

When used in a LAN working environment, the personal computer 20 is connected to the local network 51 through a network interface or adapter 53. When used in a WAN networking environment, the personal computer 20 typically includes a modem 54 or other means for establishing communications over the wide-area network 52, such as the Internet. The modem 54, which may be internal or external, is connected to the system bus 23 via the serial port interface 46. In a networked environment, program modules depicted relative to the personal computer 20, or portions thereof, may be stored in the remote memory storage device. It will be appreciated that the network connections shown are exemplary and other means of establishing the communications link between the computers may be used, e.g. dial-up modems/xDSL/cable modems, etc.

Having now described both the problems existing in the art and a suitable environment into which the solution provided by the instant invention is preferably applied, the focus is now turned to a description of a preferred embodiment of the instant invention. As indicated above, one of the first problems identified by users of NetMeeting™ 2.0 was the scalability

problems associated with the fixed limit of 32 conference members and the static allocation of system resources driven by the Win 9x platform. A preferred embodiment of the instant invention, therefore, removes the fixed limit of users (now number of members in a conference is limited only by the available memory of the host) and utilizes dynamic system resource allocation. As these problems were resolved as will be described below, an underlying problem of excessive network traffic as the number of conference members grew resulting from the prior T.128 protocol was revealed. Therefore, a preferred embodiment of the instant invention involves enhancements to the T.128 protocol to allow for the efficient scalability of the conferencing and collaboration tool. An embodiment of the instant invention incorporating the teachings below may be found in a new release of the assignee's tool, NetMeeting™ 3.0.

Before discussing the specifics of a preferred embodiment of the instant invention, a brief overview of the multimedia teleconferencing standards is appropriate to form a foundation for the following teachings. The ITU-T T.120, H.320, H.323, and H.324 standard comprise the core technologies for multimedia teleconferencing. The T.120 standards address Real Time Data Conferencing, the H.320 standards address ISDN Videoconferencing, the H.323 standard addresses Video (Audiovisual) communication on LANs, and the H.324 standard addresses video and audio communications over low bit rate connections such as POTS modem connections. H.323 is so widespread because TCP/IP is extremely common and available for LANs, WANs, dial-up, xDSL, and all sorts of Network devices/configurations. The teachings and content of these standards are herein incorporated in their entirety by reference thereto.

The T.120 family of standards cover the document conferencing and application sharing (sometimes called data conferencing) portion of a multimedia teleconference. The recommendations specify how to efficiently and reliably distribute files and graphical information in real-time during a multipoint multimedia meeting. The objective of the standards is to assure

interoperability between terminals without either participant assuming prior knowledge of the other system; permit data sharing among participants in a multimedia teleconference, including white board image sharing, graphic display information and image exchange, application sharing; and specify infrastructure protocols for audiographic or audiovisual applications.

The T.120 series governs the audiographic portion of the H.320, H.323, and H.324 series and operates either within these or by itself. The T.120 suite consists of a series of recommendations, which are summarized as follows:

Recommendation	Description
T.120	Data protocols for multimedia conferencing: This provides an overview of the T.120 series.
T.121	Generic Application Template: This provides a guide for development of T.120 application protocols.
T.122	Multipoint Communication Service (MCS) Service Description: This describes the multi-point services available to developers.
T.123	Protocol Stacks for audiographic and audiovisual teleconference applications: This specifies transport protocols for a range of networks.
T.124	Generic Conference Control (GCC): This defines the application protocol supporting reservations and basic conference control services for multipoint teleconferences.
T.125	Multipoint Communication Service (MCS) Protocol specification: This specifies the data transmission protocol for multipoint services.
T.126	Multipoint still image and annotation protocol: This defines collaborative data sharing, including white board and image sharing, graphic display information, and image exchange in a multipoint conference.
T.127	Multipoint Binary File Transfer Protocol: This defines a method for applications to transmit files in a multipoint conference.
T.128	Multipoint application sharing protocol: This defines how

	participants in a T.120 conference can share local applications such that other conference participants can see the image of the shared application, and use the mouse and keyboard to take control of the shared application as if it were running locally.
T.134	Text chat application entity: A T.121 APE definition for a text chat protocol.
T.135	User-to-reservation system transactions within a T.120 conference: This defines conferencing reservation protocols in a T.120 environment, typically between a client application and a scheduling systems which reserves resources for multipoint control units (MCUs or "bridges").
T.136	How Remote Device Control and configuration may be performed using T.120 as the transport protocol.
T.140	Protocol for multimedia application text conversation. The protocol for text chat within T.120, goes with T.134.
T.VMR	Virtual Meeting Room control. Contains some material from previous T.13x drafts, concentrates on audio + dataconferencing.

Of the above governing standards, a preferred embodiment of the instant invention provides enhancements specifically to the T.128 Multipoint Application Sharing Protocol to substantially improve scalability. As will be described more fully below, scalability is improved by eliminating a fixed limit on the number of users, by reducing the amount of additional memory needed to hold information for a new member/collaborator/sharer in a conference, by reducing the amount of additional total network traffic amongst the members of a conference required to complete the join/collaboration/share during a conference, and by reducing the computational complexity of the algorithms used, which is proportional to the amount of time required for anything to happen during a conference.

These enhancements are embodied in a new T.128 model. Unlike the global, chaotic model of NetMeeting™ 2.0, the T.128 model of the instant

invention is a per-host model. In this model, each person hosting (sharing an application) acts like a miniature server for the conference. Network traffic almost always originates from hosts only, and wends its way down to the others viewing in the conference. Members have separate state information for each person who is sharing. The updates (shared application lists, the graphics of the shared applications, the current cursor position and shape) stream down from the host. To interpret packets coming from the host only requires the viewer to know the capabilities of the host. The network traffic from a viewer is not broadcast, but sent privately back to the host, when controlling. The rest of the members in the conference see the results (changes in appearance, movement of the cursor, etc.) which are broadcast by the host later. Since input, mouse and keyboard messages, are only sent privately from a controller to a host, the latency and responsiveness, especially of the mouse, is much improved. This is especially noticeable in large conferences since there is no performance penalty as more people participate.

Specific changes in the T.128 protocol contemplated herein which allow the realization of the advantages of the instant invention involve not sending ignored user name/capabilities in some control packets; removing/ignoring many capabilities; streamlining cache capabilities negotiation when a node starts to share, stops sharing, and when a new person joins the conference; creating caches; order encoding data each time a note starts to host, and freeing/cleanup when the node stops hosting; eliminating some packet broadcasts to everyone in the conference or replacing them with targeted sends to an individual; and a new control model and new control packets. Like file transfer (T.127), T.128 has distinct send side (hosting) and receive side (viewing) parts that compose the logical T.128 applet. In the instant invention, a node in a conference is a host when it is sharing applications or its desktop. The act of hosting or sharing is the process of trapping the graphics on the screen and transmitting the updates for the entities that are shared. There is an UI applet for hosting which basically is a

dialog that lists all of the top level applications running along with the entire desktop. This UI shows what is shared, and allows a user to share/unshare items and to stop sharing everything. This applet also allows a user to change whether the shared applications/desktop are controllable, and has other options for 24-bit color sharing and automatic handling of control requests. A node in a conference is a viewer when a remote node is hosting and it has AS active (unless application sharing is prevented by system policy). The UI for viewing may be a frame window displaying the shared contents of the remote host.

A host in a conference is controllable when it has checked Allow Control in the Conf Tools menu (or if SDK code does it pragmatically). At this point, it is possible for remote viewers to take control of it. When a viewer takes control of a controllable host, it becomes the controller of the host. When a viewer of a host becomes its controller, the host's own keyboard and mouse are locked, and input comes from the controller instead. The act of controlling is the process of sending input and window activation back to the host to drive its shared entities.

When at least one node in a conference is a host, the nodes in the conference are in a share. A share is another name for an active T.128 session. T.128 is the least T.120-ized of the standard applet protocols, since it came from a non-T.120 two person only primitive world (R.11). As such, there is some redundancy. Some of the rich T.120 primitives, like getting into conferences, exchanging capabilities, and determining the roster, are found in a more primitive form in T.128. So a share gets created, joined, and ended just like a conference does. And members are added and deleted just like in a conference.

In an exemplary embodiment of the instant invention, there are four parts to the T.128 protocol: CMG, the T.120 wiring to find out about calls and activate AS sessions; S20, the share establishment/ capabilities exchange/member join/leave/share termination part; CPC, the member capabilities data sent via S20 control packets; and DATA, the AS streaming

part, for hosting and controlling, which accounts for the capabilities of the share members so it does not send data or packets that they cannot understand. The following description of an exemplary embodiment is included by way of example, and not by way of limitation, to enable one of ordinary skill in the art to practice an embodiment of the instant invention.

CMG is utilized to find out when calls start, when calls end, and when members are added/ removed. When a new call is starting, AS receives a permit to enroll indication notification. It enrolls its application by filling in a GCC session key field with appropriate key types, capability structure, etc. as is standard. The enroll request is filled in and the application enroll method is called to enroll or unenroll in the conference starting/ending. When an enroll confirm notification is received, it looks for success or failure. If failure, it cleans up as though the call had ended. If success, it enrolls the new member and watches for the application roster report indication notifications that indicate change. Finally, CMG looks for the local node in the member list, the first time it is seen the member is considered finally to be in a T.120 call. It processes its own section, looking for new members so it can add them, and for old members now gone so it can remove them. These are GROUPWARE members only, application sharing (AS) member addition/removal comes independently through the S20 protocol. When AS finally believes itself to be in a T.120 call, it attaches to the MCS domain so it can send and receive data. When the domain attachment is confirmed, AS joins two MCS channels: its own MCS user channel; and the MCS AS broadcast channel. When both of the MCS channels are joined, the system is ready.

S20 begins where CMG leaves off. In this exemplary embodiment there are six control packets, then one for data which is used by the streaming part of sharing. All S20 packets have a header. The exemplary packet types are as follows:

S20_CREATE	Control packet to create a new share
S20_JOIN	Control packet to join an existing share

S20_RESPOND	Control packet to respond to and S20_JOIN
S20_DELETE	Control packet to eject a member from the share
S20_LEAVE	Control packet to yourself leave an existing share
S20_END	Control packet to end an existing share
S20_DATA	Data packet, the S20 part is a header

When the MCS channels are joined after a new call starts, AS broadcasts an S20_JOIN packet on the T.128 channel to join an existing share. If there is an existing share, the system will see a response on the T.128 channel, an S20_RESPOND packet with the MCS user ID as the node being responded to, from the node that created the share. Others in the share will see the S20_RESPOND also. Each will add the new member into their member lists, and if successful, each will broadcast another S20_RESPOND out on the T.128 channel. This will be ignored by the existing people in the share, since they already know about these other existing members. The remote people are added one by one this way into the new member's member list. Preferably, these messages acknowledging the new person and informing him about the existing members are only sent privately to the new member to reduce network traffic. The capabilities and user name are a couple hundred bytes of data and are included in these packets. When leaving an existing share, a node broadcasts an S20_LEAVE packet on the T.128 channel. The other members of the share will see this message and remove the member leaving from their member lists. When something goes wrong letting a new node join into a share, e.g. if a share is taking place with members utilizing NetMeeting™ 3.0 embodying the teachings of the instant invention and a member utilizing the old NetMeeting™ 2.x tries to join, the share creator broadcasts an S20_DELETE packet on the T.128 channel with the MCS user ID of the node being ejected. The share ends when the share creator leaves the share. The share creator will broadcast an S20_END packet on the T.128 channel, and the other members will clean up and terminate also.

If no share exists when a user tries to share an application, that node creates a share first, then continues with sharing the application. The node broadcasts and S20_CREATE packet on the T.128 channel. There are ways of arbitrating conflict, e.g. if two participants both try to create a share around the same time. In general, in prior systems the share is not created until at least one remote node sends back an S20_RESPOND packet acknowledging the S20_CREATE request. This is why application sharing in NetMeeting™ 2.x could only activate when at least two nodes were in a conference and application sharing capable. In the system of the instant invention, however, if the node trying to create the share is also the T.120 top provider, the code assumes success instantly since the collision arbitration algorithm will always resolve in favor of closeness to the top provider. In this way, the system of the instant invention will allow the creation of a single party share, allowing one to host a meeting, share application(s) or desktop, and have it persist. The share will create instantly, and it will not terminate when no one else except the host is left in the conference. Additionally, this method is faster for the end user who wants to share applications or desktops since it completes almost immediately.

For CPC, the member name and the member application sharing capabilities are exchanged via the S20 control packets. When a new member is added into a share list, the share capabilities are recalculated. Most of these capabilities are used to determine what kind of application sharing data to send when hosting. Prior systems used to do a lot of recalculation whether it was hosting or not. The system of the instant invention, however, only does recalculation when it is hosting, since starting to host will calculate the capabilities based off the people in the share at the time anyway. Moreover, a lot of recalculation is gone completely making it a lot faster and easier to handle a new member of the share. The total capabilities block is basically a list of the area capabilities (PROTCAPS) blocks with IDs for each. Members ignore PROTCAPS blocks with unrecognized IDs.

In prior systems when a node started to host, it would calculate the

outgoing cache sizes based on the capabilities of everybody in the share. It would take the minimum of its size and those of all the other people in the share. In the case where there are sender and receiver capabilities, it would take the minimum of its send capabilities and everybody else's receiver capabilities. When the other nodes found out that somebody was hosting, they would have to calculate what size to create the incoming caches. They would then take the minimum of the host's and everybody else's capabilities. Then, when somebody new joined the share, everybody would have to recalculate the new cache sizes again. In essence, everyone in the share had to know about each other to be able to interpret and handle the packets coming from a host. Besides being expensive to recalculate all the time, it would be impossible to ever implement lurking/passive/multicast-like application sharing. This prior system could never have implemented a streaming application session, like NetShow™ presentations or multicasted video because of the impracticability of having 10,000 people find out about each other and do calculations based off each other's capabilities.

In the system of the instant invention, when a node starts to host, it creates outgoing caches with exactly the sizes it wants, which it has specified in its capabilities already as described above. When the others find out that somebody has started hosting, they create incoming caches of the sizes specified in the host's capabilities. Further, when someone new joins the share, the existing members do not have to do a thing. The new member will find out that someone is hosting, and will in turn create incoming caches from the capability sizes. In this system of the instant invention, a viewer only has to know about the host's capabilities. The viewer creates caches based off only the sizes given in the host's capabilities. After this the process is done, no recalculation is necessary. Moreover, the outgoing caches for bitmaps/ cursors/ palettes/savebits/order encoding are created on a node when it starts to host and freed when it stops. The corollary incoming caches for bitmaps/ cursors/palettes/savebits/order encoding are created for a remote node on viewers when they find out the node has started to host, and freed when they

find out the node has stopped hosting. Prior systems used to keep the caches around for a person as long as the share existed and the person was in the share. These would be reused, in the state they were left in, if the person started hosting again. This was typically megabytes of memory to keep around. However, since new members of the share would not have the saved cache state, the contents of these caches would be wiped out anyway.

The data packets transmitted, as indicated above, are prefixed with the S20DATAPACKET structures, then a DATAPACKETHEADER. These are the stream types (dictionaries). All of the packet types are grouped into one of the few streams, the groups have much in common as far as contents and sizes, so they compress together well. The types of data packets include drawing/graphics updates sent by the host and the supported font list, which is sent by everyone in the conference to each other. While this is really a capability, it is so large (could be 32K) it is not exchanged via the S20 protocol. The data packets also include control packets, active window notification sent by the host, or activate/restore requests sent to the host, the shared window list sent by the host, the hosting state (hosting applications, hosting desktop, hosting nothing anymore) sent by the host, cursor appearance/position notification sent by the host, keyboard/mouse input sent from controller to the host, and a sync packet from existing member of a share to a new member to let the new member know that the group is aware of him and how to handle data from the group. This is needed because of cache states, order encoding data, and font lists. Further data packet include the changed capability, e.g. when desktop size/color depth changes. The compression types on the packet data include: not compressed; PKZIP compressed, but atomic, no info about previous packets is need to decompress; and persistent-PKZIP compressed, information about previous packets sent on same stream is needed to decompress.

As compared with the prior versions of NetMeeting™, the system of the instant invention provides fewer and smaller Shared-Window-List (SWL) broadcast packets. These packets provide notification of the list of shard

window states, positions, sizes, along with areas that are obscured, if anything has changed since last time. In the prior systems, the SWL packets were sent by people hosting, and by non-hosts if they were in control so that everyone else would sync to the placement of shadows on their system. Shadow windows, representing shared information from other people, were always included in the list as well. When joining and leaving, an empty packet was always sent, even if the member was not hosting. There were lots of packets dropped due to collisions in z-order when multiple people were hosting, or packets applied and then another z-order packet would be sent out in a Ping-Pong effect. Now, only the host sends the SWL packets, the contents of which are simply windows shared on the host, and things that obscure parts of the shared windows. Therefore, when not hosting and joining/leaving share, no packets are sent. Further, z-order is not changing all the time because a plurality of shadows are not changing independently as before.

In addition to the fewer SWL packets, the system of the instant invention also provides fewer Active-Window-Coordinator (AWC) broadcast packets. These packets provide notification of the currently active shared window (or NULL if none), if this window has changed. These packets also provide requests to activate/minimize/change state of a shared window. In the prior systems, the current active window was sent out periodically, even when not hosting. When hosting there were many different states, and applying notifications/requests from remotes would often cause another packet to be sent in a Ping-Pong effect. Additionally, there were requests to simulate tray behavior (right clicking on tray button for shadow of shared window would cause system menu to popup on host if in control), to close and minimize windows. In the system of the instant invention, notifications are only sent by hosts about currently active window. There is no need to distinguish different types of "no shared window" active cases, meaning fewer broadcasts. Only shared window or nothing is sent. Requests are only sent from the controller to the host to activate/unminimize shared window, or to inject Ctrl+Alt+Del in case of NT Remote Desktop Sharing (RDS). RDS is a service process that

uses application sharing to share the entire desktop of a machine back to whomever called in. Ctrl+Alt+Del simulation is needed on NT because that is the way a user logs in, shuts down, or locks the workstation.

The system of the instant invention also provides fewer cursor broadcast packets, which provide current cursor image and position if either has changed. In the prior systems, the current cursor position was sent out periodically by everyone, as was the current cursor image. Depending on the control state, a node may have sent out a cursor broadcast or an input broadcast. With the system of the instant invention, only the host sends the cursor shape and position. If a host is controlled and its cursor position is out from the last know controller mouse position, a sync bit is added to the cursor position broadcast. The controller will, upon seeing this set, move his mouse to the cursor position given by the host.

The system of the instant invention also provides fewer Hosted-Entity-Tracker (HET) broadcast packets, which provide notification of current hosting application/desktop value. Before, when sharing applications the current top level shared window count was sent out. Every time a window came or went, another new count was broadcast. However, remote viewers only cared when the count transitioned to or from zero. Therefore, the system of the instant invention only sends changes from zero to non-zero (hosting applications/desktop), and from non-zero to zero (stopped hosting). The intermediate counts are useless and were ignored by the remotes, so they are no longer sent.

The system of the instant invention also provides a significant reduction in the number of Synchronizing New Individuals (SNI) broadcast packets. These packets indicate a member joining, and are sent on each stream by each existing person when a new person joins into the T.128 share. They tell the new person that the sender knows he is present, that any data from that point on takes the new person's capabilities into account, and that the new person can now process packets from the sender. These must be sent and handled before anything can continue in the share. In prior systems, when

a new person joined a share, everybody in the share would loop through everybody else in the share, and for each person broadcast a sync packet per stream. These broadcasts would happen for each stream, and there were five streams, although two of those were not really used. This meant that the prior system was synching streams that data was never sent on. Now, however, the people in the share only broadcast one packet apiece per stream a packet for the new member joining. The new member joining then broadcasts a packet for each person already in the share. In other words, application sharing nodes need to send a sync packet to people who are new to them in the share. Further, the number of streams of concern have been reduced from five to three. A sync is sent only on a stream when data is needed to be sent on it, which reduces the number still further to one for people who are just viewing.

The system of the instant invention also provides fewer Control Arbitration (CA) packets, which provide notification of the current collaboration state (detached, collaborating, controlled, in control), and which provide requests to control, grants of control handled by the node currently in control. In prior systems control was global whereby all nodes collaborating are controlled by mouse and keyboard of the node in control. Nodes could be controlled (locked) even if they were not hosting. They would play back the mouse/keyboard input, only to discard it at the last second since it should only be played back to shared applications. Every state change was broadcast, and all nodes, whether hosting or not, needed to broadcast state changes. If a packet could not be broadcast (low memory or simply too much traffic), state change would not occur. This would result in a controlled node remaining frozen, unable to use his mouse or keyboard, for a long time until it could get a packet out. Now, the control state is broadcast from hosts only when allowing control state changes or when start/stop controlling. Control operations (taking control, releasing control, bouncing control, etc.) are private between host and another node and are not broadcasted.

The system of the instant invention does provide additional new control (CA30) packets, which provide request exchanges to take control, release

control, bounce control, invite control, pass control, etc. The new control model is similar to the calling model whereby a node asks to take control of a host like placing a call to a remote. The node gets back a response (no with reason or yes). Until this response, the node can time-out or cancel the request on the viewer side. The host can allow the end user to accept or reject the incoming take control request. Either side can hang up, the controller can cancel or release control and the host can bounce control. this works locally even if packets cannot get out. Even if the system runs out of memory completely, the local node will not be stuck in a state it does not want to be in. Further, hosts can invite viewers to control them, like inviting a remote to join a conference.

In addition to the above, the system of the instant invention also provides fewer Input Manager (IM) packets. In prior systems, the person in control if collaborating, or any detached host, broadcasted input packets every mouse move/click/keypress. Everyone not collaborating treated these like notifications, and updates the keyboard state table/mouse position of the sender (and all controlled nodes if from person in control). Everyone collaborating treated these like requests and injected the input into their machine. This would be horribly slow in a large conference if a controller moved the mouse a lot. NetMeeting™ 2.x collapsed the mouse packets which resulted in jerky and unresponsive cursor movement. In the system of the instant invention, input packets are sent privately from a controller to a host, not broadcasted. The controlled host then periodically broadcasts the new cursor position/shape due to the input played back from the controller. This allows multiple hosts to be simultaneously controlled by multiple independent users. The result in very high mouse fidelity and lower bandwidth in a large conference.

The result of these changes is a substantial reduction in network traffic from existing NetMeeting™ 3.0 nodes when a new person joins a share, especially from these node that are not currently sharing. Each node was sending a lot of packets that were ignored on the remotes or did not benefit

anything. Now, when a host starts sharing the process is greatly simplified. With 50 people in a conference, e.g., the traffic to get everyone in sync shrunk from 12,851 broadcasted packets to only 265 broadcasted packets.

As an example illustrating this simplification, assume that six people are in a conference, having already exchanged capabilities and fonts, and a host starts sharing his desktop. The host broadcasts an application sharing S20_CREATE packet (which includes his name and AS capabilities). In response, five other users respond by broadcasting an S20-JOIN packet with their name and AS capabilities. For each person who joins the share, the host will perform a sanity check of the viewer's capabilities, and if there is a problem, will broadcast an S20_DELETE packet for that viewer. Assuming all is well, the host creates a person structure with the minimum amount of system resources necessary to view. The host then resets its caches (palette, graphics), and broadcasts a sync packet. The host then entirely repaints that which is shared. After this, the host retransmits its state (HET) indicating what he is sharing (desktop, application, not). After this the host sends its font packet, and waits for the viewer's font packet.

On the viewer's side, once the S20_CREATE packet is received, a sanity check is performed on the capabilities. If all is well, the viewer replies with an S20_JOIN broadcast. At this point, the viewer and host are in a share. The caches are reset, a sync packet is sent to the creator, and the font list is sent. The viewer then receives the sync from the host, the font packet, and the desktop or application HET. The viewer then creates cursor cache, a palette cache, and a bitmap cache all of size the host said. The viewer then creates the compression saved history and the order decoding structures and memory. Finally, the viewer creates a bitmap for that person's desktop, or window to view what's shared. When the viewer wants to stop viewing, he sends a HET packet indicating that nothing is shared. The viewer then destroys the window, and frees the blocks shared. However, the viewer stays in the list.

During application sharing, it is instructive to note what is needed for a viewer to represent what is on the host's screen, utilizing desktop sharing as an

example. First, the viewer needs to be able to recreate the graphics on the host's screen. This includes the cursor (logical position, image, current location, etc.), as well as the palette (were true color cannot be supported as described below). This was needed to allow translation of palette code to actual color in 256 color applications. The alternative would be to take a bitmap of the desktop. However, since this could be approximately one megabyte of data, the transmission of palette codes saves greatly. The viewer would also need to recreate the text (font, language information ,local information, character set information, multi-national information, Unicode, etc.). If a viewer does not have the font, the host does not send text drawings to the people in the conference at all. If text is put up by a shared application using a font that is not available on all remote viewers, a bitmap of that part of the screen is sent instead. While this is a lot bigger than a simple text drawing description, it is safe and can be handled by everyone in the conference. This is what application does in general when there is no commonality, it falls back to screen data. The viewer also needs the bitmap cache (toolbar images, etc.) and the order encoding cache. The host sends only change of drawing unit of the type. The header for each drawing unit indicates the field types that are being sent. If these are not there, then they are the same as the previous one. When someone joins a share, the host invalidates the entire screen and forces a refresh (repaint from scratch). Then the caches are rebuilt.

For application sharing, the host needs to represent the window to the viewer, with a list of what is shared, the z-order, the shape and position of each window, and what is currently active. When the host is being controlled by a remote, he uses a control timer mechanism to ensure that other viewers' screens are kept up to date. Therefore, the playback of input first processes fast input such as the mouse clicks, cursor position and shape. Next, the window list for application sharing indicating what and where things are is processed. Finally, the graphics are processed, including the list of orders and screen data. If, for any reason, the window list or graphics cannot be sent, they are skipped so that the fast input may again be processed.

As indicated above, the new collaboration model of the instant invention, preferably implemented in NetMeeting™ 3.0 application sharing, is per-host. By collaboration it is meant the process of allowing, inviting, granting, and revoking control to others of shared applications. This new model is developed to go along with per-host application sharing described above. In the previous versions of the application sharing protocol, T.128, collaboration was global as described above. Each member of the conference could start/stop collaborating. Exactly one of the members collaborating was considered to be in control. Her mouse/keyboard drove the mice/keyboards of the other members collaborating. Those other members were controlled, and their keyboards/mice were locked. However, if they weren't sharing anything, the mouse and keyboard input from the person in control would go to nowhere, since we only let the remotes control shared applications and not unshared ones. So their keyboards/mice were locked for no reason, which was very frustrating especially in the multitasking world of Windows.

Anybody collaborating could become the person in control by a simple action (a mouse click or key press). If several people took control around the same time, the last person to do so won, until the next person took control. There was no organization or order, it was a chaotic model, our users called it "mouse wars". With a decent number of people in a conference, the telephone was the only way to keep things from getting out of hand. There was a lot of "OK, I'm going to take control now, don't do anything anybody" discussion back and forth.

Collaboration was a two-way street. A person might only want to control another's applications without exposing his own. But that wasn't possible in this old model, collaboration was all or nothing. And there was no way for a person to gracefully decline a control operation or even know that it was about to happen--control would be yanked away without warning. This application sharing control model (a.k.a. Collaboration) is unfriendly to shared app the hosts, controllers, other meeting participants, and SDK clients. The model is a global free-for-all, with no reliable way of denying, canceling, or

undoing dangerous operations via the user interface or driving code. These problems are parallel to those people used to have with shared app views. Each person in the conference had "shadow windows", representing a top level shared window from a host. People could not move them, size them, get them out of the way, or put them back in the way when desktops were of different sizes, or change the z-order.

In this old control model, "Collaboration", means a user's mouse and keyboard are synchronized with those of all other members in the conference who are collaborating. The person in control is in control of all the other people collaborating, and his input is played back on all of those other machines. In NetMeeting™ 2.x, a user could collaborate and be driven even if he were not sharing anything. This ended up being for no reason, since all of the played back input would eventually be discarded. Pressing the "Collaborate" button would do one of several somewhat unpredictable things depending on the state of the user and other people's states. It would either cause the user to start collaborating, to take control if already collaborating, or to stop collaborating.

In this prior system, as indicated above, collaboration is GLOBAL to the conference. Collaboration is a set of states, detached or cooperating, and then in control only if cooperating. When the state changes, several broadcasts from different people occur. The potential controller broadcasts "cooperating" to start collaborating if he isn't already, the potential controller broadcasts "request control" to take control, and the current controller broadcasts "granted control" to the potential controller. Of the members collaborating, one and only one person is in control. That person's mouse and keyboard drive the mice/keyboards of the other members collaborating. Each control change requires some retransmitting of input state information, especially toggle keys, and discarding old accumulated input. The person in control broadcasts his input messages to everybody. Then all the people collaborating play back these input messages, skipping ones that obviously would manipulate non-shared windows, and then if they ended up going to a

window not shared, would swallow them at the last minute. That allows the cursor to move, but the actual movement of the mouse notification to not get sent to the windows under the mouse if they are not shared. Additionally, there was a lot of complicated token/sequence number/guessing/time stamp calculations done to figure out who has control if several people try to grab it at once, or it was taking too long to hear back. Further, taking control was a free-for-all as indicated above, anybody could take it away from the controller at any time. This often resulted with somebody in control even if there was nobody else to be controlled.

As may be apparent from the forgoing, the prior system had many areas of improvement available. Since collaboration was global, it only worked when the shared application pool was global, all in same relative place on everybody's screen. Further since collaboration was bi-directional, taking control of another's shared applications also left that user open to being controlled. Collaboration was also quite noisy, requiring several broadcasts from an individual when his state changed. To take control required three broadcasts: cooperating, request control from person taking control, granted control from person handing off control. This collaboration was also end-user chaotic, wherein everybody could take control, the last person to do so wins, which resulted in a big user interface free for-all. This collaboration was also SDK chaotic, wherein there was no way for SDK code to do conference management and get notified in real time or confirm/deny control changes. Additionally, the collaboration was not easily undoable, in that the hosts could not "bounce" the current controller while staying "controllable" for somebody else, and the controllers could not "let go" of a host without going back to the main NetMeeting™ 2.x UI and pressing the Collaborate button some random number of times. Collaboration was also not deniable, in that the hosts could not choose to accept/deny a request to take control. Nor was collaboration cancelable, potential controllers could not cancel a pending take control operation if it was taking a long time, e.g. in a large conference.

As indicated above, the new control/collaboration model of the instant

invention is per-host, a nice parallel to the new T.128 protocol. Control, rather than being global, is per-host. Each the host can be controlled by one the remote, and several the hosts can be controlled in parallel by several distinct the remotes. A member can be a host and be able to control another without opening up his own shared applications to control. However, one can not be in control of a host and controlled by another the remote at the same time. Control can be initiated, canceled and refused on either side (the host and the controller). It can be handed off to a third party. There is graceful timing out and failure handling. Both the controller and the host can continue in low memory or stress situations. Although round-trip communication between a host and a the remote is required, either side can move on and do something else without waiting to hear from the other. The user interface is also unintrusive, dialogs are not modal and hang around for a while before timing out so end user can handle them as is convenient.

The person in control sends all his input messages, mouse and keyboard, along with other information needed for states, like IME keys and TOGGLE keys, to the person controlled, privately or per-host. The person controlled plays back this input, and attempts to prevent any from going to windows/applications that are not shared. That way a controller can not actually cause a click in a non-shared application. The person controlled's mouse will move in sync with the controller, it must for dragging and other operations, but the actual mouse moves are not passed to the applications.

The controller's system does spoiling and other massaging of the input to send. For example, to prevent applications from going into drag-drop mode, application sharing waits a bit after a mouse button down looking for a mouse button up. That way the down/up go in the same packet and are played back quickly, creating a click. If the down/up were split up, the time latency is such that many applications including the explorer itself would assume the mouse was going to be used for dragging something. A corresponding example would be key downs/ups, to avoid simulated repeats, or duplicate keys caused by Windows itself generating other key sequences in the default

window handler. And since mouse moves can be discarded, if outgoing packets start to backup, they can be combined. This may somewhat increase jerkiness on the remotes, but this is better than getting stuck because so much outgoing traffic is generated that nothing else can get sent.

There is corresponding code on the controlled side to playback the input. Events at several levels have to be discarded, and there are some exceptions for discarding events with screensavers, other desktops, and system dialogs like the fault error message. The input must be played back with roughly the same time differences as it occurred on the controller. These cannot be input into to the OS all at once, since Windows™ will do different things based off the system keyboard state.

Basically, there is a pretty well-defined sequence of network traffic with control. The controller sends input events to the controlled person. The controlled person then broadcasts notifications to everybody in the conference of cursor position/shape changes and window position/appearance updates caused by playing back the input from the controller. Operation of this new control structure may be better understood from the following simple examples of how this new model works. Note that a host is a conference member sharing applications/desktop.

To indicate controllability, the host broadcasts a control state packet, with control allowed or not allowed. The remotes can use that as indication about whether to permit users to try to take control of the host via UI. To take control of a host from a the remote, the remote user selects UI like menu command (or code makes function call). The remote sends a take control request to the host. The remote waits to hear back yes/no from The host. At this point, the remote can either cancel the take control request or do some other control operation which will also cancel this one. The host displays a take control request UI to the end user (or not if unattended or passes to code to handle). The user can say yes/no. This UI is not modal, it can sit until the end user is ready, although it may time out and act like user said no. The host sends a take control reply to the remote with the yes/no result. The second

this happens, if yes, the host is controlled by the remote.

To grant control of a host to a the remote, the host user selects UI (or code makes function call). The host sends an invite control request to the remote. The host waits to hear back from the remote. At this point, the host can either cancel the invite control request or do some other control operation which will also cancel this one. The remote displays the invite control request UI to the end user (or not if unattended or passes to code to handle). This user can say either yes or no. This UI is not modal, it can sit until end user is ready, although it may time out and act like user said no. The remote sends a invite control reply to the host with yes/no result. The second this happens, if yes, the host is controlled by the remote.

If the host wants the controller bounced (hitting ESC key on the host is UI for this), the operation occurs immediately and then the host sends a bounce control inform message to the remote. If the controller wants to let go of the host, the operation occurs immediately and then the remote sends a release control inform message to the host.

If the host is controlled but the user needs to handle something temporarily, like a call dialog or a popup from some other application, the host sends a pause control inform message to the remote. The remote stays in control but can tell the user that the mouse/keyboard will not do anything until unpaused. When the user is done, the host sends an unpause control inform message to the remote, and they pick up where they left off.

To pass control of a host, the remote sends a pass control request to the host. At this point the remote is no longer in control, i.e. the remote can not undo or take back the pass control request. This is different than requesting or inviting control. The reason for this is to avoid long stacked-up sequences of people in the conference waiting for each other to take their respective actions. With control, it was decided to only allow dependencies between a host and a viewer, none between different viewers. This avoids deadlocks and jams for long periods of time. The host displays a pass control request UI to end user, who can say yes/no. If the host user says no, the host sends a pass

control reply with failure immediately to the second remote. If the host user says yes, the host forwards a pass control request to the second remote. The host waits to hear back from the second remote. At this point, the host can either cancel the pass control request or do some other control operation which will also cancel this one. The second remote displays the pass control request UI to the end user, who can say yes/no. The second remote sends the pass control reply to the host with the yes/no result. The second this happens, if yes, the host is controlled by the second remote. Otherwise, the host remains in control.

As may be apparent from the foregoing, control is made per-host, with cancelable control request, via controller UI and controller SDK code (auto and confirm mode), confirm/deny control request, via host UI and the host SDK code (auto and confirm mode), and undo-ability of control by both controller and controlled the host, via UI and SDK code. With this, the moderation/control/floor model can be managed on a per-host basis.

Therefore, the system of the instant invention provides collaboration/control which is per-host in the conference. There is no collaboration anymore; there is "controlled" (the host) and "controlling" (the viewer). The hosts can turn on/off allowing control. Only the hosts which have allowed control can be controlled. Somebody not sharing is not a host, and therefore can not allow control nor be controlled. Taking control of a host does not open oneself up to being controlled (control is now unidirectional). Control is a privately negotiated contract between the host and the viewer, which once negotiated, cannot be randomly interrupted by a third member of the conference. Further, the hosts can grab control back from a controller without asking, and a controller can release control of a host without asking. Any third party who wants to control a host can not succeed until either the host or the controller breaks the control bond.

State changes (allow control state and being controlled by x) are broadcast from the host sometime after changes actually happen. If a viewer is controlling a host, he can not be taken control of, and if a host is controlled,

he can not take control of somebody else. Further, a viewer can not control more than one host at a time, and a host can not have more than one controller at a time. To take control of a host, a potential controller sends the host a private request with an unique ID (unique to controller) identifying the request. The controller then goes into a "waiting to hear back" state during which the controller can release control, since "release" will follow the "take" request. Once the request is received, the host responds privately to the controller with "accepted" or "rejected". If accepted, the host then broadcasts state change some time later after receiving this information from the controller. During this state, the controller or the host can break the control bond at any time. If the controller breaks this bond, he sends the host privately a "released" notification, whereas if the host breaks it, he sends the controller privately a "bounced" notification. In all cases the request ID is remembered and used to identify the "control bond". This allows multiple/queued requests to be generated and responded to, ensuring the proper state on both sides when done. The hosts/controllers ignore out-of-date requests.

During the controlled period of a host, broadcast notifications involving the controller are ignored by the controller, since this controller always has more up-to-date information about his own state. If a host stops the hosting, then control state is automatically cleaned up. Likewise, if a host leaves a conference, then the host stops the hosting, and control state is automatically cleaned up. Otherwise, a controller can rely on always getting a response from the host before continuing. The controller should not send input to the host until an "accept" response has come back because the input packets do not have request IDs in them, and the host can not tell if they are out of date or not.

Everyone must handle UINT wrap-around. Allocating/sending packets can fail. For notification broadcasts, the host periodically checks if the current state (allow control/controller/requestID) is different than the last one sent. If so, the host simply tries to send new packet. For private controller/controllee

communication, it's more complicated. Unlike notification broadcasts, these can not be "spoiled". They must be queued if they can not be allocated/sent. As such, controller/host states do not change until these queued packets are sent. The one exception is "waiting for control", which happens as soon as possible as a take control request occurs, flushed or not.

If the user turns off allowing control, queued request responses are all turned into "denied-control not allowed" responses. Also, request responses following a queued "accept" must all be "denied" responses. If the user turns off allowing control, current controller is bounced as well. If the user tries to take control of a second host when a take control request is still queued, the first one is superseded. In other words, only one take control request will ever be queued. The user can release control of a host with a take control request queued. If that happens, the release simply cancels the queued take. If the user tries to take control of a host when an earlier take control request has been sent but has not yet been responded to, the first one is canceled by a "release" packet. In the meantime, the controller can do whatever it wants when waiting to hear back. A preferred embodiment of the instant invention includes a message box with a "cancel" button. Likewise, the host can do whatever it wants when it receives a "take control" request, provided it follows the rules. In a preferred embodiment, a message box with "person x would like to take control, ok/cancel" is displayed, and incoming requests are handled in order of receipt. Further, the system may, via SDK code, decide that the new controller is the one, bounce the current one, and allow the new user to take control. Further, as described above, it could remotely push control by asking a remote to take control of it.

Another advantage of the system of the instant invention is the dynamic allocation of system resources. Unlike the prior systems that allocated all of the memory which could ever be needed for each member of a conference, the system of the instant invention allocates system resources dynamically as the members require them, and then frees up those resources when they are no longer needed. Application sharing takes a lot of memory to

trap the graphics on the screen, utilizing a big enough buffer to make that a useful amount so that the system can look backwards in the buffer to minimize the amount of data which is actually sent.

As an example, if a rectangle is painted over, it does not need to be sent since the user cannot see it anyway. Additionally, if a circle is painted blue and then painted green, the system only needs to send the green information since the painting blue is hidden from the viewer. In this way, the amount of memory needed to view may be substantially reduced from that which you need to share. By separating out what one needs to view from what one needs to share yourself, the memory allocation to viewing members may be minimized, until one of those viewers starts to share. At that point, his memory allocation will be increased to accommodate the sharing requirements. When that person stops sharing, the additional memory allocation is then freed for utilization by that user for other purposes.

This dynamic memory allocation may be better understood with reference to FIGs. 2a-c. FIG. 2a illustrates in simplified bar chart form the memory allocations within the host 60, viewer A 62, and viewer B 64. As may be seen, within the host 60 memory has been allocated for itself 66, for viewer A 68, and for viewer B 70. Likewise, within viewer A 62 memory has been allocated for the host 72, itself 74, and viewer B 76; and within viewer B, memory for the host 78, viewer A 80, and itself 82.

If the host now passes control to Viewer A 62, dynamic memory allocation is accomplished as illustrated in FIG. 2b. As may be seen, upon passing control to Viewer A, the host 60 allocates additional memory 84 for itself to process the inputs from Viewer A who is now in control of the shared applications. Likewise, Viewer A 62 also dynamically allocates additional memory 86 for itself to allow it to control the host. Viewer B's memory allocations remain unchanged.

FIG. 2c illustrates the dynamic freeing of memory when control is passed back to the host 60 from viewer A 62. As may be seen, the memory allocations return to their pre-controlled states once control is passed back to

the host 60.

Another problem with the prior systems lies with their requirement of at least two users existing in a conference before application sharing is allowed as described above. The system of the instant invention changes this operation by allowing a single user to initiate and conduct a share, with no other members of the conference being present. This is accomplished by not requiring the system to wait for a response. Instead, the system assumes that the sharing has succeeded, if the person sharing is also the host of the meeting. This operation is operates properly because any collision resolution (two people attempt to share the first thing about the same time) works in favor of the host always. With this embodiment of the instant invention, a host can share an application, or several applications, and unshare them too, when he is the only person in a call. Therefore, a host can share an application, share Notepad, and collaborate, e.g., then people can call the host, hang up, and call back as many times as they like, and the shared applications and collaborate state will persist. In prior systems, a person could host a meeting and share one thing. However, that one thing was not really shared, instead it was queued up to be shared when a second person joined the call. the share button stayed disabled until that happened.

This operation was due to the application sharing protocol. When creating a share, an S20_CREATE packet was broadcast to the application sharing channel. Until an S20_RESPOND or an S20_JOIN packet was received from some other party, the share was not considered to have been created. This operation is no longer required when the creator is the top provider. Instead, the system assumes that the second the T.120 objects are had all is well. The host does not have to wait for a response from someone else. As indicated above, this works well because if the top provider and someone else ever tried to create a share around the same time, the top provider always won. When a host has shared an application alone in a conference, there is still work being performed. All of the drawings are being accumulated, but they are not going anywhere. Additionally, no periodic

calculation are happening. However, once someone else joins the share, the system proceeds as described above.

The system of the instant invention also provides true color 24bpp support through the enhancements provided to the T.128 protocol by the instant invention. As indicated above, true color application sharing is a 24bpp, non-palettized, standard interchangeable format that maps directly to the video hardware. The prior systems utilized 8bpp data which is a palettized format. To accomplish this true color application sharing, capabilities were added, negotiation of color depth to support this new capability and handle people with it properly was fixed, and the bitmap caches were revised to handle the larger memory requirements of bitmaps three times the size of those at 8bpp. Further, information was added to the drawing packets so the graphics of shared applications could be presented accurately.

True color data will only be sent if everyone has the capability to view it and everyone has a 24bpp or greater display. The reason for this is that a display of less than 24bpp will not accurately display 24bpp information. Even 16bpp (32,767 colors or 65,535 colors on NT) cannot display 24 bpp data properly because parts of the value get stripped, resulting in subtle green/blue/or red shifting, though not as extreme as today. The purpose of true color is to view accurately high color images. Therefore, is should not be utilized in circumstances where the fidelity of the results is questionable. Further, it generates a lot more data even if a member is not really sharing anything that requires it, hence the restrictions.

There is not much of a performance impact if a member is sharing an application such as Notepad™, since almost everything goes as orders which are the same size regardless of the bit depth at which it is sent. However, if a member is sharing a graphically intensive application, there may be quite an impact. This impact effects both the amount of data sent and the latency. This is because a fixed amount of memory is devoted to cached bitmaps. In true color, the bits are three times the size as 8bpp. Therefore, only one third as many entries fit in the cache, meaning that we get fewer cache hits and

must, therefore, send bitmap bits more often. Additionally, application sharing has a maximum uncompressed packet size of 32,000 bytes. That holds less packets for the same area painted. Further, there is less compression of true color screen data. The specialized algorithm to arrange the bitmap bits so they compress even better than just PKZIP only works for 4bpp and 8bpp data. PKZIP can only look back a fixed amount of bytes in the data, so sequences of the same color block do not shrink as well.

When supporting true color 24bpp, the system does not distribute any palettes/color tables. When the color depth changes because someone leaves the conference, the system forces a repaint of the shared information. Prior systems did not do this even when switching between 4bpp and 8bpp, which resulted in some remotes seeing weird artifacts. Additionally, an unused field in orders packet is used to specify the sending color depth that they were generated for. Screen data has the color depth, so users know what to do with it, but orders did not. Under the prior system, users would not know whether to map a color to the closest palette entry or just use it plain. With the system of the instant invention, the drawing operations may be replayed properly. Further, the system of the instant invention will not compress any packet less than 256 bytes (prior system constant set at 128 bytes). Additionally, the system will persistently PKZIP packets less than or equal to 4k, which is the amount of persistent dictionary data saved. As it turns out, most packets larger than 256 bytes but smaller than 4k contain drawing orders.

In a further embodiment of the instant invention, the system dispenses with the exchange of capabilities and fonts. This allows true multicasting to take place (lurking). In this embodiment of the instant invention, the host simply transmits a periodic refresh, at which point he clears his cache and begins to rebuild them and forces a complete repaint of his screen. Since fonts are no longer exchanged, just images are sent to populate the cache and allow proper display on the viewer's screen (cache font glyphs). This elimination of capabilities and font exchange allows streaming of data to thousands of users which would otherwise be nearly impossible to complete.

Numerous modifications and alternative embodiments of the instant invention will be apparent to those skilled in the art in view of the foregoing description. Accordingly, this description is to be construed as illustrative only and is for the purpose of teaching those skilled in the art the best mode for carrying out the invention. Details of the structure and implementation of the various components described above can be varied substantially without departing from the spirit of the invention, and exclusive use of all modifications that come within the scope of the appended claims is reserved.

What Is Claimed Is:

1. A method of sharing an application program or desktop between a host of a multipoint data conference and a plurality of conference participants, comprising the steps of:

calculating within the host minimum capabilities of all conference participants in the share;

broadcasting from the host to the conference participants in the share sizes of caches required to view the shared information based on the calculated minimum capabilities;

establishing within the conference participants caches as required by the host.

2. The method of claim 1, wherein a new conference participant joins the share, further comprising the steps of:

re-calculating within the host minimum capabilities of all conference participants in the share including the new conference participant;

broadcasting from the host to the conference participants in the share sizes of caches required to view the shared information based on the calculated minimum capabilities;

establishing within the conference participants caches as required by the host.

3. The method of claim 2, further comprising the steps of:

broadcasting a sync packet to the conference participants;

repainting the shared information based on the re-calculated minimum capabilities.

4. The method of claim 1, wherein a conference participant leaves the share, further comprising the steps of:

re-calculating within the host minimum capabilities of all conference participants in the share excluding the conference participant who has left the share;

broadcasting from the host to the conference participants in the share sizes of caches required to view the shared information based on the calculated minimum capabilities;

establishing within the conference participants caches as required by the host.

5. The method of claim 4, further comprising the steps of:

broadcasting a sync packet to the conference participants;

repainting the shared information based on the re-calculated minimum capabilities.

6. The method of claim 1, wherein the steps of calculating within the host minimum capabilities of all conference participants in the share and establishing within the conference participants caches as required by the host precludes calculation of minimum capabilities of all conference participant within the conference participants.

7. The method of claim 1, further comprising the step of transmitting privately a request to control a shared application between the host and one conference participate.

8. The method of claim 7, further comprising the steps of:

passing control of the shared application to a conference participant;

transmitting privately control commands for the shared application between the host and the conference participant in control of the shared application; and

periodically broadcasting from the host updates to the shared application program to all of the conference participants.

9. The method of claim 8, further comprising the step of ignoring within the conference participant controlling the application program the broadcast update from the host.

10. The method of claim 8, wherein the step of periodically broadcasting updates includes the step of periodically broadcasting updates with a sync, further comprising the step of updating the shared program information within the conference participant controlling the application program.

11. The method of claim 1, further comprising the steps of:

receiving a join request from a new member;

broadcasting a respond packet from the host;

adding the host to a member list within the new member in response to the respond packet from the host;

adding the new member into a member list within each of the conference participants in response to the respond packet from the host;

broadcasting a respond packet from each of the conference members;

adding each of the conference members to the member list within the new member in response to the respond packet from each of the new members; and

ignoring within each of the conference members the respond packets from each of the conference members already included in the member lists.

12. The method of claim 11, wherein the step of broadcasting a respond packet from each of the conference members is broadcasted only on a single channel.

13. The method of claim 1, further comprising the steps of:

receiving a leave broadcast packet from one of the conference members; and

deleting the conference member who broadcast the leave packet from a member list in each of the conference members.

14. The method of claim 1, further comprising the steps of:

receiving a delete broadcast packet from the host identifying a conference member; and

deleting the conference member identified in the delete packet from a member list in each of the conference members.

15. The method of claim 1, further comprising the steps of:

receiving an end broadcast packet from the host; and

deleting caches required by the host; and

deleting a member list of all participants in the share.

16. The method of claim 1, wherein the step of calculating within the host minimum capabilities of all conference participants in the share includes the step of calculating the minimum capabilities of all conference participants and the host.

17. The method of claim 1, further comprising the steps of:

receiving a join request from a new member;

broadcasting a respond packet from the host;

adding the host to a member list within the new member in response to the respond packet from the host;

adding the new member into a member list within each of the conference participants in response to the respond packet from the host;

transmitting privately a respond packet from each of the conference members to the new member; and

adding each of the conference members to the member list within the new member in response to the respond packet from each of the new members.

18. A method of establishing an application program share session in a multipoint data conference, comprising the steps of:

generating a create share message;

assuming success of share session without waiting for a response to the create share message.

19. The method of claim 18, further comprising the step of hosting a multipoint data conference, and wherein said step of assuming success is accomplished during said step of hosting.

20. The method of claim 19, further comprising the step of admitting a first multipoint data conference participant, and wherein said step of assuming success is accomplished prior to said step of admitting a first multipoint data conference participant.

21. The method of claim 20, further comprising the step of setting up attributes prior to said step of admitting a first multipoint data conference participant.

22. The method of claim 20, further comprising the step of setting up applications prior to said step of admitting a first multipoint data conference participant.

23. The method of claim 20, further comprising the step of setting up files to be shared prior to said step of admitting a first multipoint data conference participant.

24. The method of claim 19, further comprising the steps of:

dismissing all other conference participants from the application program share session; and

maintaining the application program share session after all other conference participants have been dismissed.

25. The method of claim 18, further comprising the steps of:

admitting a conference participant to join the application program share session;

receiving a request from the conference participant to assume control of the application program; and

denying control of the application program to the conference participant.

26. The method of claim 18, further comprising the steps of:

admitting a conference participant to join the application program share session;

receiving a request from the conference participant to assume control of the application program; and

granting control of the application program to the conference participant.

27. The method of claim 26, further comprising the steps of:

receiving application program control inputs from the conference participant controlling the application program; and

periodically broadcasting control input updates to the application program.

28. The method of claim 27, wherein said step of receiving application program control inputs includes the step of communicating on a per-host basis with the conference participant controlling the application.

29. The method of claim 18, further comprising the steps of:

admitting a conference participant to join the application program share session;

transmitting a request to the conference participant to assume control of the application program; and

receiving a denial to assume control of the application program from the conference participant.

30. The method of claim 18, further comprising the steps of:

admitting a conference participant to join the application program share session;

transmitting a request to the conference participant to assume control of the application program;

receiving a acceptance to assume control of the application program from the conference participant; and

allowing the conference participant to control the application program.

31. The method of claim 30, further comprising the steps of:

receiving application program control inputs from the conference participant controlling the application program; and

periodically broadcasting control input updates to the application program.

32. The method of claim 31, wherein said step of receiving application program control inputs includes the step of communicating on a per-host basis with the conference participant controlling the application.

33. A method of controlling a shared application in a multipoint data conference having a host and at least one conference participant, comprising the steps of:

sharing an application program; and

indicating a willingness to have the application program controlled by conference participants.

34. The method of claim 33, further comprising the steps of:

receiving a request from a conference participant to assume control of the application program; and

denying control of the application program to the conference participant.

35. The method of claim 33, further comprising the steps of:

receiving a request from a conference participant to assume control of the application program; and

allowing control of the application program to the conference participant.

36. The method of claim 35, further comprising the steps of:

receiving application program control inputs from the conference participant controlling the application program; and

periodically broadcasting control input updates to the application program.

37. The method of claim 36, wherein said step of receiving application program control inputs includes the step of communicating on a per-host basis with the conference participant controlling the application.

38. The method of claim 35, further comprising the step of bouncing control of the application program from the conference participant.

39. The method of claim 35, further comprising the step of pausing control of the application program by the conference participant.

40. The method of claim 35, further comprising the steps of:

receiving a request from the conference participant controlling the application program to pass control to another conference participant; and

denying the request to pass control.

41. The method of claim 35, further comprising the steps of:

receiving a request from the conference participant controlling the application program to pass control to another conference participant; and

approving the request to pass control.

42. The method of claim 33, further comprising the steps of:

transmitting a request to a conference participant to assume control of the application program; and

receiving a denial to assume control of the application program from the conference participant.

43. The method of claim 33, further comprising the steps of:

transmitting a request to the conference participant to assume control of the application program;

receiving a acceptance to assume control of the application program from the conference participant; and

allowing the conference participant to control the application program.

44. The method of claim 43, further comprising the steps of:

receiving application program control inputs from the conference participant controlling the application program; and

periodically broadcasting control input updates to the application program.

45. The method of claim 44, wherein said step of receiving application program control inputs includes the step of communicating on a per-host basis with the conference participant controlling the application.

46. The method of claim 33, further comprising the steps of:

receiving a request to assume control of the application program; and

automatically denying the request after a period of time.

47. The method of claim 33, further comprising the steps of:

receiving a request to assume control of the application program; and

having the request canceled by the conference participant.

48. The method of claim 33, further comprising the steps of:

receiving a first request to assume control of the application program;

receiving a second request to assume control of the application program; and

automatically denying the second request.

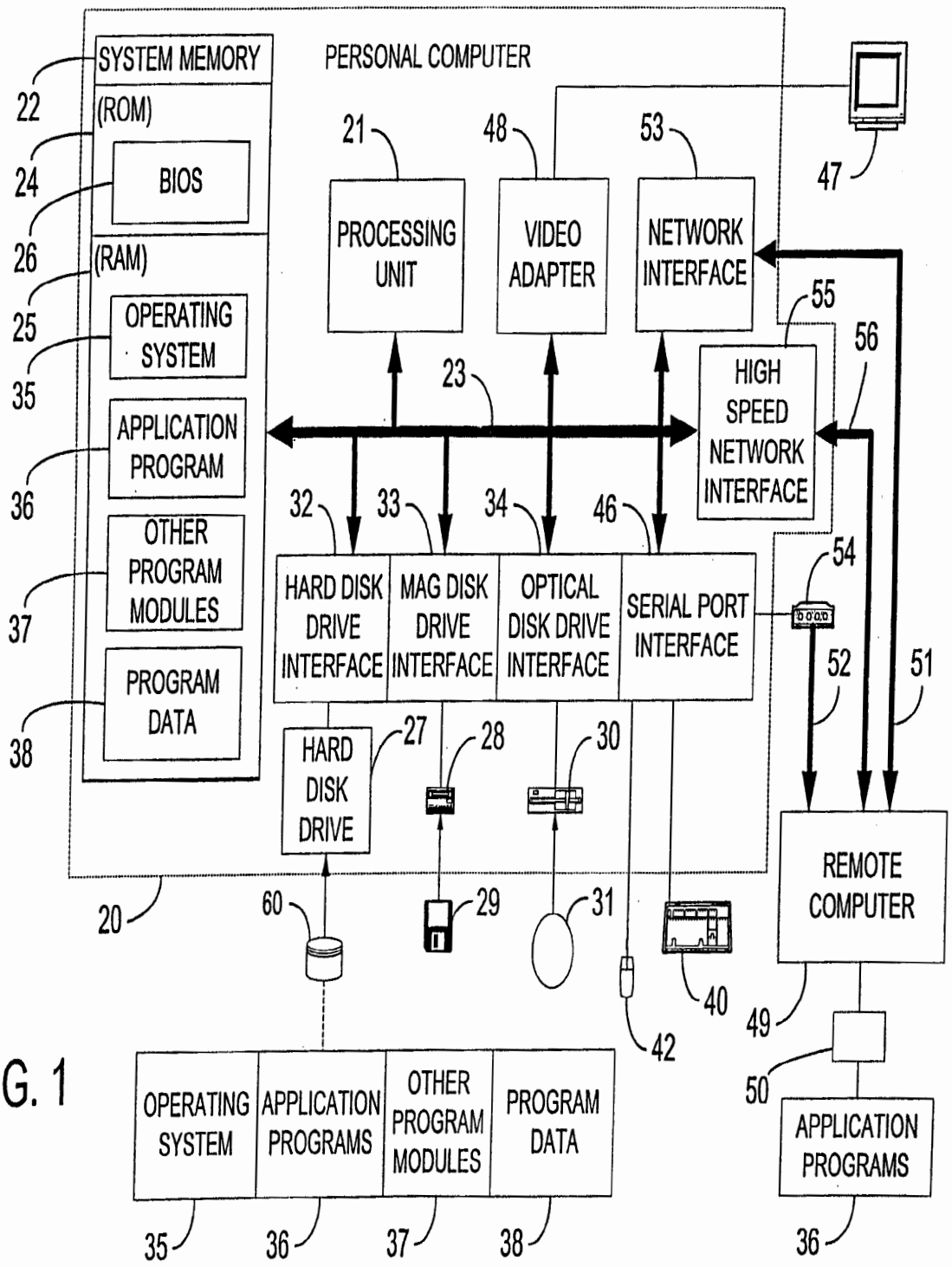

PERSONAL COMPUTER
SYSTEM MEMORY
(ROM)
BIOS
(RAM)
OPERATING SYSTEM
APPLICATION PROGRAM
OTHER PROGRAM MODULES
PROGRAM DATA
PROCESSING UNIT
VIDEO ADAPTER
NETWORK INTERFACE
HIGH SPEED NETWORK INTERFACE
HARD DISK DRIVE INTERFACE
MAG DISK DRIVE INTERFACE
OPTICAL DISK DRIVE INTERFACE
SERIAL PORT INTERFACE
HARD DISK DRIVE
REMOTE COMPUTER
APPLICATION PROGRAMS
OPERATING SYSTEM
APPLICATION PROGRAMS
OTHER PROGRAM MODULES
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FIG. 1

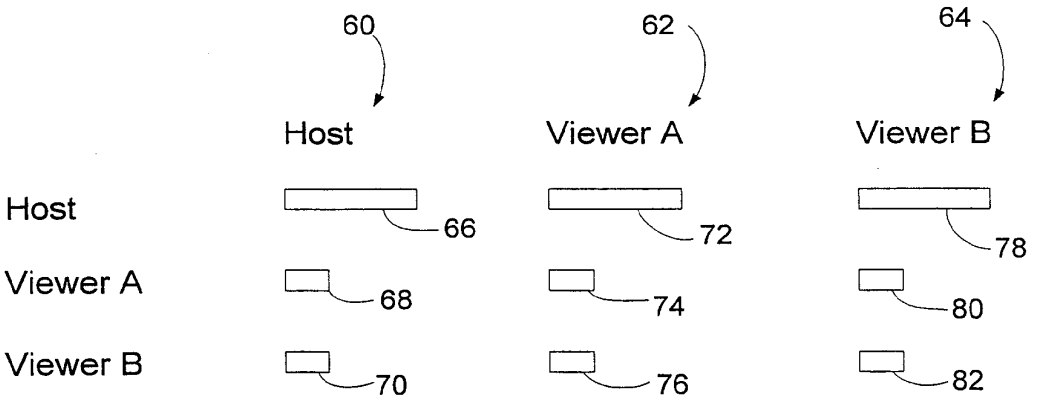


Fig. 2A

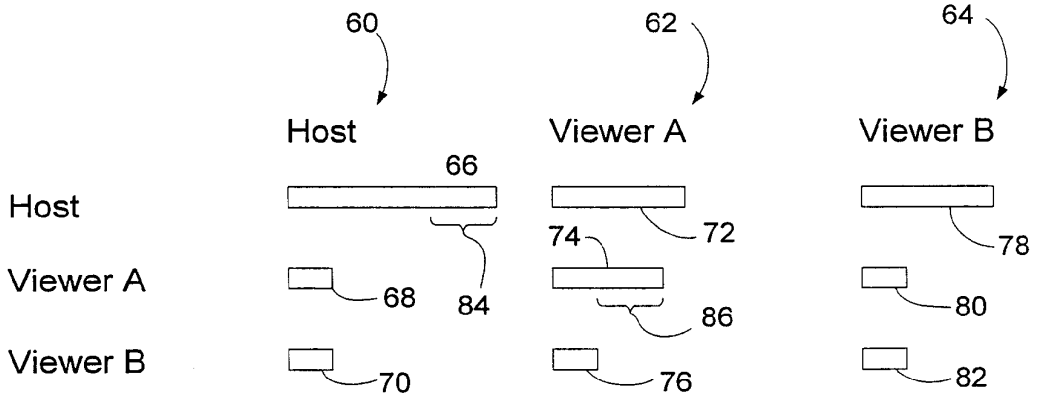


Fig. 2B

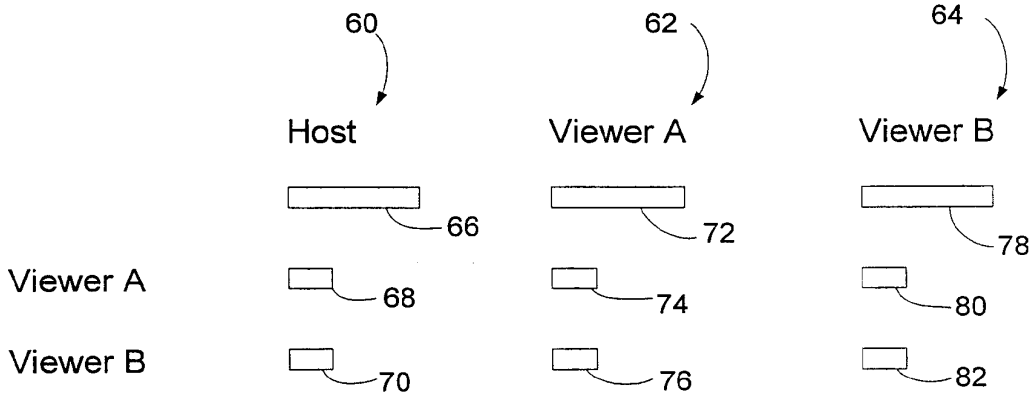


Fig. 2C

SUBSTITUTE SHEET (RULE 26)

INTERNATIONAL SEARCH REPORT

Inte. onal Application No
PCT/US 00/01198

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L12/18 H04M3/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 812 534 A (ARIMILLI HARINARAYANA ET AL) 22 September 1998 (1998-09-22) abstract column 1, line 50 -column 2, line 67 ---	1,18,33
A	US 5 471 318 A (ARAVAMUDAN MURALI ET AL) 28 November 1995 (1995-11-28) abstract claims 1,2 figures 5,6 ---	1,18,33
A	DE 38 18 087 A (SIEMENS AG) 7 December 1989 (1989-12-07) abstract column 1, line 45 -column 2, line 29 ---	1,18,33
	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 August 2000	17/08/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Poggio, F

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INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/US 00/01198

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	OHMORI T ET AL: "COOPERATIVE CONTROL FOR SHARING APPLICATIONS BASED ON DISTRIBUTED MULTIPARTY DESKTOP CONFERENCING SYSTEM: MERMAID" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON COMMUNICATIONS,US,NEW YORK, IEEE, vol. -, 14 June 1992 (1992-06-14), pages 1069-1075, XP000326831 ISBN: 0-7803-0599-X the whole document	1,18,33

1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter onal Application No
PCT/US 00/01198

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5812534 A	22-09-1998	US 5452289 A	19-09-1995
		WO 9615601 A	23-05-1996
		CA 2104701 A	09-07-1994
		EP 0630141 A	21-12-1994
		JP 9238200 A	09-09-1997
		US 5535204 A	09-07-1996
		US 5453986 A	26-09-1995
		US 5617423 A	01-04-1997
		US 5471470 A	28-11-1995
		US 5574725 A	12-11-1996
		US 5673268 A	30-09-1997
		US 5592586 A	07-01-1997
		US 5500859 A	19-03-1996
		US 5559793 A	24-09-1996
		US 6009082 A	28-12-1999
		US 5546395 A	13-08-1996
		US 5619508 A	08-04-1997
		US 5673257 A	30-09-1997
		US 5577041 A	19-11-1996
		US 5600649 A	04-02-1997
		US 5790532 A	04-08-1998
		US 5815503 A	29-09-1998
		US 5764627 A	09-06-1998
		US 5754589 A	19-05-1998
		US 5764628 A	09-06-1998
		US 5864560 A	26-01-1999
US 5471318 A	28-11-1995	AU 679995 B	17-07-1997
		AU 6815594 A	08-11-1994
		BR 9406356 A	02-01-1996
		CA 2160895 A	27-10-1994
		CN 1121758 A	01-05-1996
		EP 0698328 A	28-02-1996
		JP 3032014 B	10-04-2000
		JP 8511917 T	10-12-1996
		NZ 266588 A	29-01-1997
		WO 9424807 A	27-10-1994
DE 3818087 A	07-12-1989	NONE	

Form PCT/ISA/210 (patent family annex) (July 1992)

BARCO PCT

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
BL 10002		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP2012/068166	14/09/2012	14/09/2011
Applicant		
BARCO N. V.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language,** the international search was carried out on the basis of:
      [X] the international application in the language in which it was filed
      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
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6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1a
      [X] as suggested by the applicant
      [ ] as selected by this Authority, because the applicant failed to suggest a figure
      [ ] as selected by this Authority, because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/068166

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N7/15 H04N21/41 G06F9/54 H04M3/56
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04N G06F H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/036509 A1 (ACHARYA SHRIKANT [US] ET AL) 17 February 2005 (2005-02-17) paragraph [0036] - paragraph [0044] figures 1,2	1-61
A	EP 1 187 480 A1 (TELESUITE CORP [US]) 13 March 2002 (2002-03-13) paragraph [0070] - paragraph [0089] figures 1, 5a - 6d	1-61
A	US 2004/263636 A1 (CUTLER ROSS [US] ET AL) 30 December 2004 (2004-12-30) paragraph [0046] - paragraph [0048] paragraph [0106] - paragraph [0108] paragraph [0142] - paragraph [0153] paragraph [0168] - paragraph [0193] figures 1-4,7-10	1-61

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 February 2013	06/03/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Van der Zaal, Robert

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2012/068166

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005036509 A1	17-02-2005	NONE	
EP 1187480 A1	13-03-2002	AT 220838 T	15-08-2002
		AT 311724 T	15-12-2005
		AU 697578 B2	08-10-1998
		AU 3634495 A	09-04-1996
		CA 2200477 A1	28-03-1996
		DE 69527440 D1	22-08-2002
		DE 69527440 T2	20-02-2003
		DE 69534660 D1	05-01-2006
		DE 69534660 T2	27-07-2006
		EP 0806115 A1	12-11-1997
		EP 1187480 A1	13-03-2002
		JP H10508990 A	02-09-1998
		US 5572248 A	05-11-1996
		US 5751337 A	12-05-1998
		US 6160573 A	12-12-2000
		US 6445405 B1	03-09-2002
		US 2003020805 A1	30-01-2003
		US 2004100553 A1	27-05-2004
		US 2007120954 A1	31-05-2007
		WO 9609722 A1	28-03-1996
US 2004263636 A1	30-12-2004	US 2004263636 A1	30-12-2004
		US 2009046139 A1	19-02-2009

Form PCT/ISA/210 (patent family annex) (April 2005)

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
BL10012		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP2012/068167	14/09/2012	11/10/2011
Applicant		
BARCO N.V.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
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      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
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3. [ ] **Unity of invention is lacking** (see Box No III)

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6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1a
      [X] as suggested by the applicant
      [ ] as selected by this Authority, because the applicant failed to suggest a figure
      [ ] as selected by this Authority, because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/068167

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N7/15 H04N21/41 G06F9/54 H04M3/56
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04N G06F H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 2004/263636 A1 (CUTLER ROSS [US] ET AL) 30 December 2004 (2004-12-30) paragraph [0046] - paragraph [0048] paragraph [0106] - paragraph [0108] paragraph [0142] - paragraph [0153] paragraph [0168] - paragraph [0193] figures 1-4,7-10	1-81

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 February 2013	19/03/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Van der Zaal, Robert

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2012/068167

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005036509 A1	17-02-2005	NONE	
EP 1187480 A1	13-03-2002	AT 220838 T	15-08-2002
		AT 311724 T	15-12-2005
		AU 697578 B2	08-10-1998
		AU 3634495 A	09-04-1996
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		DE 69527440 D1	22-08-2002
		DE 69527440 T2	20-02-2003
		DE 69534660 D1	05-01-2006
		DE 69534660 T2	27-07-2006
		EP 0806115 A1	12-11-1997
		EP 1187480 A1	13-03-2002
		JP H10508990 A	02-09-1998
		US 5572248 A	05-11-1996
		US 5751337 A	12-05-1998
		US 6160573 A	12-12-2000
		US 6445405 B1	03-09-2002
		US 2003020805 A1	30-01-2003
		US 2004100553 A1	27-05-2004
		US 2007120954 A1	31-05-2007
		WO 9609722 A1	28-03-1996
US 2004263636 A1	30-12-2004	US 2004263636 A1	30-12-2004
		US 2009046139 A1	19-02-2009

Form PCT/ISA/210 (patent family annex) (April 2005)

BARC0143PCT

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
BL 10013		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP2012/068168	14/09/2012	14/09/2011
Applicant		
BARCO N.V.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

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6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 2
      [X] as suggested by the applicant
      [ ] as selected by this Authority, because the applicant failed to suggest a figure
      [ ] as selected by this Authority, because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/068168

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N7/15 H04N21/41 G06F9/54 H04M3/56
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04N G06F H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 187 480 A1 (TELESUITE CORP [US]) 13 March 2002 (2002-03-13)	1,11
Y	paragraph [0070] - paragraph [0089] figures 1, 5a - 6d	2-10, 12-81
Y	US 2005/036509 A1 (ACHARYA SHRIKANT [US] ET AL) 17 February 2005 (2005-02-17) paragraph [0036] - paragraph [0044] figures 1,2	2-10, 12-81
A	US 2004/263636 A1 (CUTLER ROSS [US] ET AL) 30 December 2004 (2004-12-30) paragraph [0046] - paragraph [0048] paragraph [0106] - paragraph [0108] paragraph [0142] - paragraph [0153] paragraph [0168] - paragraph [0193] figures 1-4,7-10	1-81

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 February 2013	04/03/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Van der Zaal, Robert

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2012/068168

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1187480 A1	13-03-2002	AT 220838 T	15-08-2002
		AT 311724 T	15-12-2005
		AU 697578 B2	08-10-1998
		AU 3634495 A	09-04-1996
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		DE 69527440 D1	22-08-2002
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		DE 69534660 D1	05-01-2006
		DE 69534660 T2	27-07-2006
		EP 0806115 A1	12-11-1997
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		JP H10508990 A	02-09-1998
		US 5572248 A	05-11-1996
		US 5751337 A	12-05-1998
		US 6160573 A	12-12-2000
		US 6445405 B1	03-09-2002
		US 2003020805 A1	30-01-2003
		US 2004100553 A1	27-05-2004
		US 2007120954 A1	31-05-2007
		WO 9609722 A1	28-03-1996
US 2005036509 A1	17-02-2005	NONE	
US 2004263636 A1	30-12-2004	US 2004263636 A1	30-12-2004
		US 2009046139 A1	19-02-2009

Form PCT/ISA/210 (patent family annex) (April 2005)

BARo139PCT

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
BL 10014		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP2012/068169	14/09/2012	18/04/2012
Applicant		
BARCO N.V.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language,** the international search was carried out on the basis of:
      [X] the international application in the language in which it was filed
      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
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   a. the figure of the **drawings** to be published with the abstract is Figure No. 1a
      [X] as suggested by the applicant
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Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/068169

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L12/18
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/031779 A1 (THEURER DAVID F [US] ET AL) 9 February 2006 (2006-02-09)	1,3,13, 15,25, 34,40, 52,69, 80-82
Y	page 1, paragraph 2 - page 18, paragraph 157	2,4-12, 14, 16-24, 26-33, 35-39, 41-51, 53-68, 70-79,83

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
21 January 2013	28/01/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Oteo Mayayo, Carlota

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/068169

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 00/52887 A1 (MICROSOFT CORP [US]) 8 September 2000 (2000-09-08) page 1, line 10 - page 44, line 1 -----	2,4-12, 14, 16-24, 26-33, 35-39, 41-51, 53-68, 70-79,83
A	EP 1 246 395 A1 (MOTOROLA INC [US]) 2 October 2002 (2002-10-02) column 1, paragraph 2 - column 8, paragraph 45 -----	1-83

1

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2012/068169

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006031779 A1	09-02-2006	US 2006031779 A1	09-02-2006
		WO 2006127429 A2	30-11-2006
WO 0052887 A1	08-09-2000	AT 557492 T	15-05-2012
		AU 3471500 A	21-09-2000
		DK 1159803 T3	18-06-2012
		EP 1159803 A1	05-12-2001
		EP 2264943 A2	22-12-2010
		EP 2290524 A2	02-03-2011
		EP 2400383 A1	28-12-2011
		US 6584493 B1	24-06-2003
		WO 0052887 A1	08-09-2000
EP 1246395 A1	02-10-2002	AT 305686 T	15-10-2005
		DE 60206312 T2	16-03-2006
		EP 1246395 A1	02-10-2002
		US 2002136166 A1	26-09-2002

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[Continued on next page]

(54) Title: ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

(57) Abstract: An electronic meeting tool and method for communicating arbitrary media content from users at a meeting is described. These can include a node configuration means adapted to operate a display node of a communications network, the display node being coupled to a first display. The node configuration means is adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display. At least one peripheral device adapted to communicate the user selected arbitrary media content via the communications network is provided, wherein the peripheral device is a connection unit comprising: (e) a connector adapted to couple to a port of a processing device having a second display, a memory and an operating system; and (f) a transmitter for communicating with the communications network, A program is provided that is adapted to be loaded onto the processing device and to run on the operating system of the processing device, said program being adapted to obtain user selected arbitrary media content, said program leaving a zero footprint on termination. An input device is provided to allow the user to carry out a user action that triggers transfer of said user selected arbitrary media content to said transmitter through said port.

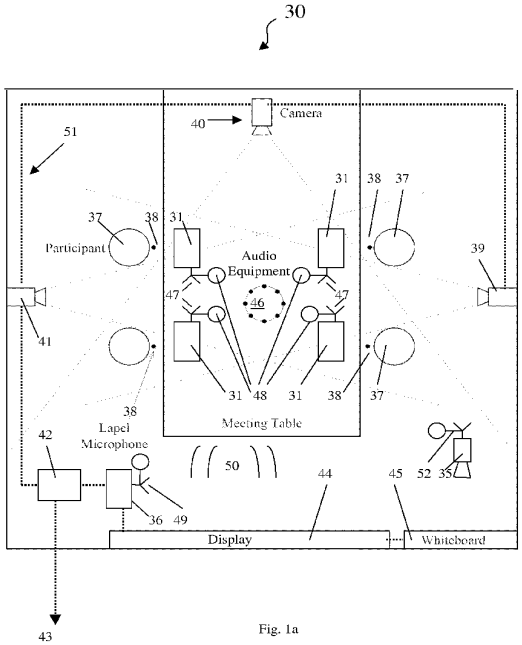


Fig. 1a

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ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

The present invention relates to electronic tools for meetings with audio including methods or devices for providing connection to a communications network, to networks or methods of operating the network, methods or devices for use in displaying media content with audio as well as software for performing any of these methods.

Technical background

Tools for collaboration

Allowing *ad hoc* groups of persons to communicate with each other is one of the fundamental aspects of collaboration, problem solving, negotiation, teaching and education, etc. To assist in communication, there has been an explosion of electronic communication tools such as electronic conferencing tools, e.g. synchronous and asynchronous conferencing, online chat, Instant Messaging, audio conferencing, videoconferencing, data conferencing, application sharing, remote desktop sharing, electronic meeting systems, collaborative management (coordination) tools, project management systems, knowledge management systems, and social software systems.

One classic approach is the lecture or seminar often involving a presentation using presentation software. To a large extent the traditional single person presentation or lecture has been maintained with the audience being in a rather passive mode as far as determining, constructing, augmenting or modifying the information to be presented is concerned.

As with other business processes, meetings are going digital. Increasingly, people are using computer technology alone and in conjunction with broadband networks to support their meeting objectives prior to and during an actual meeting. For example, e-mail is used to pass around files for people to read prior to a meeting.

Collaborative workspaces in corporate networks and on the Internet offer geographically distributed collaborators a virtual repository for documents related to a

project or a meeting. Electronic meeting support systems, such as interactive network-connect whiteed boards and videoconferencing appliances, are available for the benefit of those who share the same room as well as those who are in remote locations.

The AMIDA Final Public Report describes the overall methodology behind the development of meeting support technologies. It reports that numerous studies confirm that meetings dominate the way people work. Namely, according to a study conducted by MCI Worldcom in 2003 a business person participates in 60 meetings per month. People meet in groups for a multitude of reasons. They interact in numerous predictable and unpredictable ways and the results of their interactions are as varied as the people who participate and the projects on which they are collaborating or communicating. Studies of business processes also reveal that approximately 80% of the "workload" associated with a project or process happens in preparation for a meeting. In other words, many people view the "live" meeting as a milestone or deadline by which they can pace and measure their productivity and that of their colleagues. Unfortunately, for many information managers, being in perpetual meetings has reduced their ability to prepare adequately for the next meeting, perpetuating a vicious and negative cycle.

However, Marc Al-Hames et al. report in "Audio-Visual Processing in Meetings: Seven Questions and Current AMI Answers", that although large parts of working days are consumed by meetings and conferences, unfortunately a lot of them are neither efficient, nor especially successful. They report a study in which people were asked to select emotion terms that they thought would be frequently experienced in a meeting. The top answer – mentioned from more than two third of the participants – was "boring"; furthermore nearly one third mentioned "annoyed" as a frequently perceived emotion.

The conclusion is that despite the plethora of electronic aids to meetings, fundamental problems in handling meetings have not been solved. In fact organising and conducting meetings in a business context involves a large number of factors.

Participation

A lack of efficiency of meetings is addressed in the article “Mood indicators on electronic meeting tools” IBM, IP.com number: IPCOM000011711D, Publication Date: March 12, 2003. This article addresses the issue that the lack of direct feedback makes meetings clumsy, inefficient and often unproductive. It proposes a “mood indicator” as well as an "I want to ask a question" indicator which allow the presenter to choose an appropriate moment to pause, change track or field a question. It is argued that interrupting a presenter in full flow can be awkward; however, sometimes it is difficult to get an opportunity to ask a question or make a comment when many different people are trying to make their voices heard. In a similar vein, US6966035 suggests displaying a “murmur frame” for a participant to express a view. To increase user participation, US 2010/0087139 discloses a system for sending a selection to another computer, and US 2006/0095376 discloses a system for secure voting. Commenting, voting or selecting requires that a central authority provides the information that is to be selected or commented or voted on. Hence, these proposals still leave a central figure such as the presenter in a dominating position and the other members of the meeting are largely an audience with limited selection or voting or participation rights.

A further problem with meetings is that someone is usually late or has to leave early. With the person arriving late one has to decide if the meeting is interrupted and a summary of the proceedings so far is given. For the person leaving early (often a senior person), subsequent discussions can go missing. If there is a notes taker, this provides a personal summary of the meeting – but not an objective one.

Presents systems do not provide an optimal solution.

Legal and security issues

A legal requirement of a meeting is that presentations, comments and submissions need to be completely reproducible – in some circumstances, e.g. in a share holders’ meeting, the events in the meeting should be subject to total recall. Computer-supported collaborative work technologies, particularly those which capture human verbal and non-verbal communications (audio and video interaction) in addition to text and graphics generated during a meeting, promise to have a long term impact on how

people will prepare for and behave during and following meetings. In addition, connecting to a network brings the danger of virus, malware or spyware transfer in either direction, and there is danger of copying of confidential information.

Practical Difficulties

Scalability and ease of use

There are even more fundamental problems with using electronic tools in meetings. If two persons want to make two presentations then usually either both presentations must be placed on one machine or there is a need to swap between the presenters' machines. To bring the display content of a computer to a projector, the most common ways are to use a cable that connects the display adapter of the graphics card to the video input of the projector [method 1] or to use a software that captures the display contents and sends it over a wired or wireless network to a remote base unit connected to the projector [method 2]. This is often called "remote desktop" and is mostly used for remote administration or remote IT assistance purposes.

Less common but also practiced methods are to use a special device connected to the display adapter of the graphics card, that captures, encodes and streams the display content over a wired or wireless network [method 3].

Method 1 has several practical problems and disadvantages. In meetings where people want to contribute content from their own computers, e.g. to project images on a display, typically a video cable such as a VGA cable is used to connect each PC one at a time to the projector. This is not only not scalable but also can be and often is quite a cumbersome process that typically wastes valuable meeting time and takes the dynamism out of the meeting. Connection can be made more difficult and time consuming for example if the computer has to be rebooted for it to detect the projector or when the format of the PC differs from the format of the projector. In addition changing format can leave the computer with a new format that is not compatible with its own screen so that on reboot of the PC alone, nothing is displayed on the computer screen. Without a visible screen image the necessary re-configuration can be difficult. These issues are aggravated by a number of elements:

- The use of many different video adapters, such as VGA, DVI, DP, HDMI,…
- Reach depends on cable length: too long leaves a tangled cable "salad" in the meeting room, too short reduces flexibility, often necessitating people to move around in the meeting room when they want to present something.
- Cable connection is either point to point or requires tedious and extensive cabling and the use of complex and expensive video switches.
- It is often difficult and time consuming to find the right display resolution and refresh rate that both the computer and the display or projector support.

Method 2 also has many drawbacks. If the connection is made to a corporate LAN there is a danger of virus, malware or spyware transfer in either direction, there is danger of copying of confidential information, and there is the difficulty of making the connection, e.g. entry of a user code and password, as well the administration of such passwords and user codes.

The advantage of method 3 is that the computer does not need to use its own processing power to bring the display content in a form that is easily transported over a network. This advantage becomes less relevant as computers grow in processing power. A drawback of method 3 is that the same problems often encountered with method 1 of connecting to the display adapter remain. Another drawback is that the special device referred to requires significant processing power, which means that this device will consume much power, be relatively big and certainly be relatively expensive.

An alternative method in the making today is to use the well known USB interface of the computer for extracting the display content of the computer. US 2009/0198839 discloses such a pluggable cable arrangement. US 2011/0115689 discloses a similar USB solution for wireless connection to a projector. Accordingly connecting a projector to a computer using the standard USB port might become commonplace with time. However, this usually requires special drivers and even special hardware. Connecting a projector to a computer using the standard USB port hence might become commonplace – but even when that happens there will be a mix of new and legacy machines for several years.

Firewalls

Additional problems can occur with firewalls. Typically a visitor to a meeting will bring a computer such as a laptop that is set up for a different corporate networking environment and hence has different or incompatible networking settings. The setting up of a firewall can be complicated and if this is not done correctly, telecommunication software that has to pass through a firewall may be blocked. In order to solve problems associated with firewalls it may be necessary to open ports or identify or even add programs in an exception list. If, besides a network (hardware) firewall and an operating system firewall, there is any software based third-party firewall like ZoneAlarm, CA Internet Security Suite or McAfee Firewall, then it is necessary to follow that software developer's documentation to place programs on a safe list or adding exceptions to the firewall rules. Such activity is beyond the usual user. Fussing with computer settings, or having to call for IT support wastes valuable meeting time and takes the dynamism out of the meeting.

Audio

Software based systems for presentations typically rely on specific software drivers to be installed on the client PC. An example of this is Soundflower on Apple Mac OS/X. In case the built-in generic audio driver is used, it is hard to guarantee that the audio will work on any given hardware, considering the large variety of sound cards in PC's.

Conclusion

The following problems remain for holding a face-to-face meeting using advanced electronic tools at the present time:

- Complexity of the networking infrastructure.
- High demands on technical expertise of users in current systems that are supposed to be designed to support everyday use by the non-expert user.
- Barriers to the use of complicated technology in meetings.
- Great variety of possible collaborative software solutions – none of which seems to solve the fundamental problems of holding successful meetings.
- Meetings being boring or annoying for members of the meeting.
- Complexity of firewalls and other security measures employed in corporate

networks.

- Lack of, or restriction of participation by members of a meeting.
- Time taken to prepare presentations for meetings.
- Need to record events in the proper time sequence at meetings without burdening a meeting more than necessary.
- Lack of standards for audio
- Need to install proprietary drivers for audio
- Large number of different, non-standardised sound cards in use

Although some tools solve some of these problems effectively, no electronic meeting tool solves all of them.

Summary of the invention

An object of the present invention is to provide network solutions including electronic tools with audio for meetings as well as devices for providing connection to a communications network, to methods of operating the network, methods of displaying media content with audio as well as software for performing any of these methods or for implementing such systems.

In one aspect the present invention relates to a method for capturing audio for use in presentation systems e.g. at meetings. A wireless network may be used to connect a processing device such as a laptop, personal computer, PDA, smartphone etc to a display device, e.g. via a projector. The present invention addresses the problems caused by the many different audio cards in use for commercial PC's, a lack of a standard way for capturing audio that works on all PC platforms (Windows, Mac, Linux, Android) and the need for synchronization of the captured audio with the captured video to provide lip synchronization.

The present invention provides in embodiments a method and a system for connecting a processing device, e.g. a digital processing device such as a laptop, smartphone, PDA, computer, tablet and suchlike to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices. The method and/or

system are adapted for:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;

c) coupling the processing device to a communications network via the peripheral device;

d) routing audio data between the processing device and the communication network via the means for communication, wherein the generic communication protocol is used for transferring the audio data between the processing device and the peripheral device.

In particular the method and/or system can be adapted for:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;

c) coupling the processing device to a communications network via the peripheral device;

d) routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

In an embodiment audio data is captured through a virtual sound card interface added as a logical device over the physical interface provided in the peripheral device. On the processing device only a generic sound driver such as a USB sound driver is required which is generally standard on any modern processing devices such as a PC (UAC1 or UAC2).

In an aspect the present invention provides an electronic meeting tool for communicating arbitrary media content from users at a meeting comprising:
a node configuration means adapted to operate a display node of a communications network, the display node being coupled to a first display, the node configuration means being adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display; and
at least one peripheral device adapted to communicate the user selected arbitrary media content via the communications network, wherein the peripheral device is a connection unit comprising:

(a) a connector adapted to couple to a port of a processing device having a second display, a memory and an operating system; and
(b) a transmitter for communicating with the communications network,

a program adapted to be loaded onto the processing device and to run on the operating system of the processing device, said program being adapted to obtain user selected arbitrary media content, said program leaving a zero footprint on termination, and
an input device to allow the user to carry out a user action that triggers transfer of said user selected arbitrary media content to said transmitter through said port.

Obtaining user selected arbitrary media content is preferably not obtained by application sharing but by the process of screen scrapping. Although software packages that provide screen scraping require installation on the target device, or at least require the installation of dedicated and/or custom drivers, embodiments of the present invention use software stored on the peripheral device which allows screen scraping when run on the processing device but leaves a zero footprint when terminated. Embodiments of the present invention can screen scrape full HD videos at 20fps without requiring any installation of a program on the processing device nor requiring configuring the processing device such as a PC that they run on for the connectivity to the network hence meeting "zero footprint" operational requirements.

The program adapted to be loaded onto the processing device and to run on the

operating system of the processing device and being adapted to obtain user selected arbitrary media content can be stored on the peripheral device. The transmitter can be a wireless transmitter or transceiver. The peripheral device can be a plug-and-play device. The program can adapted to screen scrape content of the second display.

The input device can be physical actuator coupled to the peripheral device. The physical actuator preferably has a surface area of between 100 and 14,400 square mm. Alternatively, the input device can be a key displayed on the second display. The key displayed on the second display can be one not screen scraped by the program.

On the peripheral device a mass storage device is provided that stores the software to be run on the processing device. The mass storage device can be logically closed once the software has been read and loaded and is running from RAM in the processing device. Also provided on the peripheral device is a further device such as an HID (human interface device) to capture user input and provide user feedback. In embodiments of the present invention, the peripheral device contains multiple internal logical devices that are combined:
An HID (human interface device) used for capturing user input (e.g. following a user action such as pressing or activating a button) and providing user feedback, e.g. by an optical indicator such as a light ring around the button e.g. an LED ring,
for streaming the screen scraped video content to the network and hence to a base unit and a display,
A mass storage device used to store the application, and optionally
An audio device that acts as a virtual sound card to a client PC over USB, using a generic driver such as a UAC1 or UAC2 device driver.

Embodiments of the present invention are not limited to application sharing but make use of screen scraping which is able to capture all material in a neutral manner rather than being limited by proprietary applications. Further the screen scraper application is zero footprint on termination rather than being fully installed on the processing device. Embodiments of the present invention can provide arbitrary "full content" to the meeting room and participants can display in real-time,
The real-time content is shown on a central display rather than being broadcast to

individual participants or archived.

Embodiments of the present invention "auto compose" arbitrary user data on a central display or screen so that full real-time content that is provided by multiple meeting participants who intentionally share this content in order to make the meeting more effective and efficient,

Embodiments of the present invention implement a principle of "democratic screen sharing", in which the meeting participants decide themselves on a peer-to-peer basis which content to share when and where. In particular in some embodiments a participant can obtain unilateral access to the display device, i.e. without agreement of other participants. Peer-to-peer data sharing differs from systems in which the content to be displayed is determined by a presenter or meeting director. The user determines where his content is routed to and can do so without any software configuration on the user processing device.

In another aspect the present invention provides a method for connecting a processing device to a communications network, the processing device having a memory, a display and an operating system with at least one pre-installed generic driver providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the method comprising the steps of:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;

c) coupling the processing device to a communications network via the peripheral device;

d) routing screen scraped data between the processing device and the communication network via the means for communication, wherein the generic communication protocol is used for transferring the screen scraped data between the processing device and the peripheral device.

The routing of the screen scraped data can be to a defined network node such as a display node without user entry of configuration details. Thus the routing can be

dedicated to a specific network node such as a display node, base station etc. This is achieved by pairing of the peripheral device to the relevant node before the communication starts.

In accordance with embodiments of the present invention users start an application from the peripheral device such as a USB dongle, thus making the connection in a 3 step process: (1) connect, e.g. plug in the peripheral device to the processing device, (2) start the screen scraping application, (3) perform a user action such as click on a button on the peripheral device to go allow content to be displayed on the central screen or display. To achieve step 2 Autorun or AutoPlay can be used with some Windows operating systems, but there are many different variants based on the OS version and which patches have been installed. Furthermore, this mechanism is generally considered a security hazard, which is why most IT departments will disable Autorun/Autoplay. Other OS providers have disabled this function, e.g. Apple removed a similar functionality entirely from its OS/X since Snow Leopard.

In an embodiment of the present invention a very small service - also called daemon on some OS's – is provided that requires installation on the processing device such as a laptop. This service is pre-installed on the processing device. The installation is required only once on every processing device such as a laptop. The role of this is to provide a permanently running service which continuously monitors if a peripheral device according to the present invention has been offered up for connection to the processing device. When such a peripheral device is connected, the service will detect this and start the client application software residing in the mass storage area of the peripheral device. Once the service is installed, connectivity with the peripheral device becomes a 2 step process: connect, e.g. plug in the peripheral device to the processing device, (2) perform a user action such as click on a button on the peripheral device to allow content to be displayed on the central screen or display. The application loaded from the processing device still leaves a zero footprint on termination

Step b) can comprise presenting the peripheral device to the processing device as a human interface device (e.g. a USB HID) and wherein the pre-installed generic driver is a human interface device driver (e.g. USB HID driver).

Alternatively or additionally step b) can comprise presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

Alternatively, or additionally step b) comprises presenting the peripheral device to the processing device as a composite device (e.g. USB composite device) and wherein pre-installed generic drivers drive different device interfaces independently.

A client application can be stored on the peripheral device which when run on the processing device obtains the screen scraped data. Such a client application can be a portable application and can leave a zero footprint on termination.

In another aspect the present invention provides a peripheral device for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:
a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver;
a third software code portion for screen scraping data from the processing device; and
a fourth software code for routing screen scraped data between the processing device and the communications network over the means for communication; wherein the first software code portion is adapted to use the generic communication protocol for transferring the screen scraped data between the processing device and the peripheral device.

The first software code portion can be adapted to present the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver. The first software code portion can be adapted to present the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver. The first software code portion can be adapted to present the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

The executable software code can comprise fifth code for providing a means for connecting to the communications network including a base node. The third code can comprise means for capturing video frame buffers of the processing device.

The executable software code can comprise sixth code for providing a means for encoding, compressing and optionally encrypting the screen scraped data and sending the screen scraped data the communication network. The executable software code can comprise seventhcode for providing a means for handling the peripheral device. The executable software code can comprise eighth code for providing means for initiating connection to the base node. The executable software code can comprise ninth code for receiving inputs from an input device on the peripheral device. The executable software code can comprise tenth code for providing a means for sending state changes to the visual indicator on the peripheral device. The executable software code can comprise eleventh code for providing a means for presenting to the user a GUI. The executable software code can comprise twelfth code for presenting a GUI for administration of the said executable software code when executed as a portable application. The executable software code can comprise thirteenth code for providing a means for displaying and activating a key on the display of the client processing device for allowing a user to input the start the transfer of data from the processing device to the base node.

In another aspect the present invention provides a peripheral device for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing

a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:

a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;

a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver; and

a third processing software code for routing data between the processing device and the communications network over the means for communication; wherein the first software code portion is adapted to use the generic communication protocol for transferring the data between the processing device and the peripheral device, and an input device coupled to the peripheral device, the input device being adapted to react to a user action to trigger the transfer of the data from the processing device to the peripheral device.

The first software code portion can be adapted to present the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver. The first software code portion can be adapted to present the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver. The first software code portion can be adapted to present the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

The input device is preferably a physical actuator coupled to the peripheral device. The physical actuator preferably has a surface area of between 100 and 14,400 square mm. The input device can be for example a key for display on the display. The executable software code can comprise fourth code for providing a means for connecting to the communications network including a base node. The executable software code can comprise fifth code for providing a means for capturing video frame

buffers of the processing device. The executable software code can comprise sixth code for providing a means for encoding, compressing and optionally encrypting the video frames and sending them over a secure link to the base node. The executable software code can comprise seventh code for providing a means for handling the peripheral device. The executable software code can comprise eighth code for providing a means for initiating connection to the base node. The executable software code can comprises ninth code for receive inputs from an input device on the peripheral device. The executable software code can comprise tenth code for providing a means for sending state changes to the visual indicator on the peripheral device. The executable software code can comprise eleventh code for providing a means for presenting the user a GUI. The executable software code can comprise twelfth code for presenting GUI for administration of the executable software code when executed as a portable application. The executable software code can comprise thirteenth code for providing a means for displaying and activating a key on the display of the processing device for allowing a user input to start the transfer of data from the processing device to the base node.

In another aspect of the invention a peripheral device is provided for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:

a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;

a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver;

a third software code portion for receiving media content from the network and for displaying the media content on the display in accordance with a set of rules; wherein the first software code portion is adapted to use the generic communication protocol

for transferring the media content between the peripheral device and the processing device.

The executable software code can comprise fourth code for providing a means for correctly configuring a receiver as an access point. The executable software code can comprise fifth code for providing a means for listening for output of connection units trying to connect on a specific port. The executable software code can comprise sixth code for providing a means for a GUI for administration purposes. The executable software code can comprise seventh code for providing a means for publishing its presence over the network using the zeroconf protocol. The executable software code can comprise eighth code for providing a means for accepting and installing software updates. The executable software code can comprise ninth code for providing a means for providing facilities for pairing of connection units to the processing device. The executable software code can comprise tenth code for providing a means for auto-composing of different incoming arbitrary media streams and rendering of composited image on display. The executable software code can comprise eleventh code for providing a means for receiving, decrypting and decoding incoming arbitrary media content. The executable software code can comprise twelfth code for scaling of incoming arbitrary media streams. The executable software code can comprise thirteenth code for providing a means for displaying incoming arbitrary media content in accordance with a set of rules.

The present invention also provides a method for communicating arbitrary media content from users at a meeting comprising:
operating a display node of a communications network, the display node being coupled to a first display, to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display; and
connecting a peripheral device to a port of a processing device and communicating the user selected arbitrary media content via the communications network,
loading a program onto the processing device and running the program on the operating system of the processing device to obtain user selected arbitrary media content, said program leaving a zero footprint on termination, and
triggering transfer of said user selected arbitrary media content to said transmitter

through said port after a user action on an input device.

The present invention also provides a peripheral device comprising:
a base
a connector for connection to a plug and play port of a host processing device,
a flexible connection between the base and the connector for transferring data signals and power,
an actuator on the base for actuating a signal and for transferring the signal to the connector for transfer to the port, wherein the base has electronics comprising permanent storage for storing a portable application, a processing engine, a transceiver and a visual indicator.

The present invention also provides a method for providing communication connectivity from a processing device,
setting up a communications network between a base node of the communications network and a peripheral device coupled to the processing device;
transferring media content between the processing device and the peripheral device,
transmitting the media content from the peripheral device to the communications network,
receiving media content from the communications network at the base node and displaying the media content on a display in accordance with a set of rules.

Any of the above software code stored on a non-transitory storage medium.

Definitions

"Plug and play" is a term used to describe the characteristic of a computer bus, or device specification, which facilitates the discovery of a hardware component in a system, without the need for physical device configuration, or user intervention in resolving resource conflicts. Plug and play devices can be added to a bus of a computing system (while running or when shut down), and the newly added device and possibly the rest of the computing system is automatically configured to make the newly added device work, both from hardware and from software perspective.

Plug and play interfaces include for example (not an exhaustive list): Firewire (IEEE-1394), PCI, Mini PCI, PCI Express, Mini PCI Express, PCMCIA, PC Card, Universal Serial Bus (USB), SDIO cards.

"Auto-configuration" is the automatic configuration of devices without manual intervention, without setting any switches or jumpers, and without any need for software configuration. An example of auto-configuring devices: USB devices. Examples of auto-configuring protocols: DHCP, Zeroconf, Bonjour.

A plug and play device has auto-configuration software by default to make it plug and play. Example: USB devices are made to be plug and play by including the correct auto-configuration software (e.g. host driver, host stack, application software). Autoconfiguration can also refer to a software alone and is not restricted to a physical device.

"Hot swapping and hot plugging" are terms used to describe the functions of replacing computer system components without shutting down the system. More specifically, hot swapping describes replacing components without significant interruption to the system, while hot plugging describes the addition of components that would expand the system without significant interruption to the operation of the system. A well-known example of this functionality is the Universal Serial Bus (USB) that allows users to add or remove peripheral components such as a mouse, keyboard, or printer. Other examples are eSATA, PCIe, FireWire, for example.

A “portable application” (portable app), sometimes also called standalone, is a computer software program designed to run without installation on the target machine. This type of application is stored on a removable storage device such as a CD, USB flash drive, flash card, or floppy disk – storing its program files, configuration information and data on the storage medium alone. It is a program that can be stored on an electronic device such as a USB flash drive, iPod, memory card, portable hard drive or other portable electronic device and runs on a computer or other processing device coupled to the electronic device without making permanent configuration

changes to the host computer. All such programs have a zero-footprint, meaning all temporary files, registry entries, and any other changes to the machine exist only while the program is running.

To be considered a portable application, for purpose of this invention, a software program must:
Not require any kind of formal installation onto a computer's permanent storage device to be executed, and can be stored on a removable storage device such as USB flash drive, iPod, memory card, portable hard drive or other portable electronic storage device thus enabling it to be used on multiple computers.
Settings are stored with, and can be preferably carried around with, the software (i.e., they are written to the electronic device such as a USB drive). Settings are not stored to the registry or any other central system database of the computer.

Leaves a zero (or near-zero) "footprint" on any PC it is run on after being used. i.e., all temporary files/registry settings should be either avoided or at least removed once the program has exited, and files created by the user can be saved directly to the same removable media as the application is stored on.

A portable application does not leave its files or settings on the host computer on which it runs. For example, the application does not write to the Windows registry or store its configuration files (such as an INI file) in the user's profile; instead, it stores its configuration files in the program's directory. Another requirement, since file paths will often differ on changing computers due to variation in Windows drive letter assignments, is the need for applications to store them in a relative format. Preferably, such a program does not require a launcher program to copy necessary settings and files to the host computer when the application starts and move them back to the application's directory when it closes as this may leave a residue on the hard drive in case of power failure.

"Electronic meeting systems" (EMS) need to be distinguished on the one hand from classic groupware, on the other from web conferencing systems. In reality, there is some overlap between minor features of products of the named categories. The main

difference from groupware is the intensity of collaboration. EMS should be distinguished from systems with which it is possible to show the contents of an individual computer screen on a remote display with multiple users at the same time.

"Groupware" supports collaboration within groups where the individual contributions remain identifiable. In contrast, EMS enable the group to cooperatively produce a result for which the group is responsible as a whole. In a business process, groupware and electronic meeting systems complement each other: Groupware supports teams when researching and creating documents in the run up to an EMS session or when implementing the results of such a session.

"Web conferencing systems" and "electronic meeting systems" complement each other in the online meeting or workshop: EMS extends the web conferencing system by providing interactive tools for producing and documenting group results. On the other hand, "web conferencing systems" complement EMS with the screen sharing and voice conferencing functionality required in synchronous online meetings and not present in EMS.

"Data conferencing" refers to a communication session among two or more participants sharing computer data in real time. Interaction and presentation devices such as a screen, keyboard, mouse, camera, etc. can be shared. It is a term used to distinguish from video conferencing and audio conferencing. The data can include screen, documents, graphics, drawings and applications that can be seen by the participants of the meeting.

"Application sharing" is an element of remote access, falling under the collaborative software umbrella, that enables two or more users to access a shared application or document from their respective computers simultaneously in real time. Generally, the shared application or document will be running on a host computer, and remote access to the shared content will be provided to other users by the host user. Application sharing should be distinguished from systems in which collaboration on the applications between different users is not possible but the contents of individual computer screens can be projected onto a remote display with multiple users at the

same time.

The term "arbitrary media content" refers to the fact that a user may generate, create or select any media content that is appropriate to display. This differs from client voting on, or selecting of media content that is displayed by another in a meeting or presentation. This term refers to client oriented, distributed rights and privileges for the display of content rather than a central presenter providing content which is presented to the members of the meeting.

"Screen scraping" in our sense refers to reading the video frame buffers and processing them, rather than just rendering them on a display. Screen scraping for presentations is described in US2002/0196378 to Slobodin et al which is included herein by reference.

"Auto composition" or "auto layout" refers to the automatic nature in which multiple graphics/video sources are rendered on a central display, without user intervention and in a way that a user would intuitively expect it to happen.

"Wireless" and "wireless communication network" can be any network that does not use cable links between nodes, e.g. uses RF, optical or InfraRed for communication purposes, such as IrDA, diffuse infra-red, WLAN, WiMax, WiFi, WiFi Direct, Bluetooth or any other wireless communication network known to the person skilled in the art such as optical networks like LiFi.

"Computer" generally refers to a processing device, i.e. having a processing engine capable of various types of digital processing, such as rendering graphics images for display. A computer can be in the form of a work station, a personal computer, a lap-top, a palm top, a PDA, a smartphone, a tablet etc. Generally a computer has memory such as volatile RAM. Non-volatile memory such as a hard disc, optical disk or solid state memory can be included in the computer or can be a peripheral device. Currently most computers are electronic but the term "computer" also include optics based computing devices.

The term "pre-installed generic driver" is intended to mean a driver which is installed on a processing device such as a computer as a standard driver, e.g. is installed with the installation of the operating system. Such a driver is standard for the operating system and can drive a standard class of peripheral devices coupled to or connected to the processing device. The installation of a specific driver for such a peripheral device is not required. Such a generic driver can be a human interface driver (HID) or a mass storage device driver, which has predetermined software components configured for driving mass storage, a CD-ROM, a keyboard etc. or combinations of these. Such devices can be readable and writable computer peripheral memory devices such as USB memory sticks, flash memories, external hard drives, or more.

Brief Descriptions of the drawings

Fig. 1a shows a meeting room that can be used with embodiments of the present invention. Fig. 1b shows a combination of a client processing device, a connection unit, a base node and a display in accordance with an embodiment of the present invention.

Fig 2 shows a screen display in accordance with an embodiment of the present invention.

Figs. 3 to 5 show a base node and a peripheral device and a client processing device in accordance with embodiments of the present invention.

Fig 6 shows a display in accordance with an embodiment of the present invention.

Fig. 7 shows a peripheral device in accordance with an embodiment of the present invention.

Fig. 8 shows a client processing device in accordance with an embodiment of the present invention.

Fig. 9 shows a further client processing device in accordance with an embodiment of the present invention.

Fig. 10 shows an embodiment of a peripheral device in accordance with an embodiment of the present invention.

Fig. 11 is a schematic representation of a communications system for presentations in which audio has been integrated in accordance with an embodiment of the present invention.

Detailed Description of the Embodiments of the present Invention

The present invention will be described with respect to particular embodiments and with reference to certain drawings but the invention is not limited thereto but only by the claims. The drawings described are only schematic and are non-limiting.

Furthermore, the terms first, second, third and the like in the description and in the claims, are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. The terms are interchangeable under appropriate circumstances and the embodiments of the invention can operate in other sequences than described or illustrated herein.

Moreover, the terms top, bottom, over, under and the like in the description and the claims are used for descriptive purposes and not necessarily for describing relative positions. The terms so used are interchangeable under appropriate circumstances and the embodiments of the invention described herein can operate in other orientations than described or illustrated herein.

The term "comprising", used in the claims, should not be interpreted as being restricted to the means listed thereafter; it does not exclude other elements or steps. It needs to be interpreted as specifying the presence of the stated features, integers, steps or components as referred to, but does not preclude the presence or addition of one or more other features, integers, steps or components, or groups thereof. Thus, the scope of the expression "a device comprising means A and B" should not be limited to devices consisting only of components A and B. It means that with respect to the present invention, the only relevant components of the device are A and B.

Similarly, it is to be noticed that the term "coupled", also used in the description or claims, should not be interpreted as being restricted to direct connections only. Thus, the scope of the expression "a device A coupled to a device B" should not be limited to devices or systems wherein an output of device A is directly connected to an input of device B. It means that there exists a path between an output of A and an input of B which may be a path including other devices or means.

Elements or parts of the described devices may comprise logic encoded in media for performing any kind of information processing. Logic may comprise software encoded in a disk or other computer-readable medium and/or instructions encoded in an application specific integrated circuit (ASIC), field programmable gate array (FPGA), or other processor or hardware.

References to software can encompass any type of programs in any language executable directly or indirectly by a processor.

References to logic, hardware, processor or circuitry can encompass any kind of logic or analog circuitry, integrated to any degree, and not limited to general purpose processors, digital signal processors, ASICs, FPGAs, discrete components or transistor logic gates and so on.

Embodiments of the present invention provide solutions to three major problems with meetings:

a) the time taken to prepare for a meeting. This is mainly achieved by allowing "on-the-fly" presentation of any displayable information. This information does not have to be linked into any particular presentation software, nor to be compatible with any such presentation software,
b) the time taken to conduct the meeting using electronic meeting tools. This is achieved by reducing the time to connect computers to the display or projection system.
c) the time taken to reflect and review and document the meeting afterwards. This is achieved by providing the possibility of recording the course of the meeting in the same time sequence that it was carried out as well as be able to store all data presented and who presented it.

Fig. 1a is a schematic representation of a generic meeting room 30 with a meeting table that can be used with embodiments of the present invention. Participants 37 having some form of processing device 31 such as a laptop computer, a tablet, a PDA

etc. Each of the processing devices 31 can be a host device and has a first connection unit 47 to which it is coupled. The first connection unit 47 provides access to a network 50 which in this case is a wireless network, but could be a wired network. Each connection unit 47 may be coupled to an input device 48 which will be described in more detail later. A user 37 will typically at a distance from the processing device 37 which is ergonomically satisfactory. This ergonomic boundary is typically an area of about 1000 sq cm to 4000 sq cm. This ergonomic boundary will typically have the user as one side of the boundary and the comfortable reach of the arms will determine an area on the left and right of the processing device which falls within the ergonomic boundary and the far edge of the boundary of the processing device (normally delimited by a display screen) will determine the other side of the ergonomic boundary. The area defined by the ergonomic boundary will overlap or include the processing device 31itself. The processing device will also have an outer physical boundary. The input device 48 is preferably arranged to operate outside the boundary of the processing device 31 but within the ergonomic boundary. Preferably the input device is arranged to function when it is flat on the table. The input device preferably has a size of activation area of between 1 and 144 square cm.

Preferably the network 50 is a local area network, i.e. preferably local to the meeting room for security reasons but the network 50 may have access to other local or wide area networks such as 51 or to a larger corporate network or the internet 43, for example via a router 42. Another node of the network 50 is the base or display node 36. This node 36 may optionally be a wireless access point. The base node 36 may also be a processing device or host computer and may be coupled to a second connection unit 49 that provides access to the network 50 thus linking all of the processing devices 31, 36 together. The connection unit may have an input device as described above. Alternatively, network connections installed on the base node 36 can be used. Audio equipment 46 may be provided, e.g. a telephone that allows other members of the meeting to call in from remote destinations.

The display node 36 is coupled to and adapted to allow display of media on some kind of display 44. The display node is in embodiments of the present invention a base node of the communications network 50. The display 44 may be a projector and/or screen,

the projector being coupled to the base node 36. A whiteboard 45 can optionally be provided that can be optionally coupled to the display 44 and/or the base node 36, e.g. when the whiteboard can record electronically what is written on it. Optionally, a camera 35 may be provided to record the entries on the whiteboard 45. The camera 35 may have a third connection unit 52 for connecting the camera 35 to the network 50 so that the data from the whiteboard can be recorded and stored or transmitted to other networks via router 42. The connection unit 52 may have an input device 53 as described above for the connection unit 47.

Optional equipment can be cameras 39, 40, 41 for recording the progress of the meeting. These cameras can be linked by a network 51, e.g. a cable network to the router 42 and/or the base node 36. Another optional item is a microphone or microphones 38 that can be used to transfer audio, e.g. to the processing devices 31 and to loud speakers (not shown) attached to the base node 36 or part of the display 44.

Any or all of the outputs of the processing devices 31, the cameras, the whiteboard, etc. can be recorded and stored digitally, e.g. in node 36 or elsewhere to provide a complete record with correct time sequence.

Summarising the above, the present invention provides an electronic meeting tool for communicating arbitrary media content between different users 37 (with their own processing devices 31, e.g. PC, mobile phone, or tablet) and one display or projector or multiple displays or projectors 44 in the meeting room 30.

Referring to Figs. 1a and 1b embodiments of the present invention comprise a base or display node 36 being a processing device, e.g. a host computer adapted to receive user selected arbitrary media content, the base node 36 being coupled to a central display 44 which can be a fixed format display and/or a projector or similar. The arbitrary media content can be provided from any of the user processing devices 31. The base node 36 can be adapted to display the received user selected arbitrary media content in accordance with a set of rules, e.g. FIFO, automatically, on request or approval, forced to display, in accordance with a priority etc. Optionally the base node

36 is adapted to force display of the received user selected arbitrary media content, i.e. to allow participation in the meeting by an individual user displaying own selected content on display 44 independently of the person who is nominally responsible for giving a presentation or chairing the meeting. Forcing the display can also be considered as a rule. The meeting tool can also be adapted to allow a priority setting. This means that a user can set a priority setting for the media to be displayed. A priority of "1" for example can be interpreted by the base node as a forced display, a priority "2" can be interpreted by the base node as display as soon as possible, priority "3" can be interpreted by the base node as place in queue and display as the time comes etc. Setting and using priorities for display are also considered to be working to rules. To execute the rules, the base node 36 may have a decision module. The base node 36 may be a host computer having a processing engine such as a microprocessor and a memory. Preferably, the base node 36 is adapted to treat media content passed to the base node 36 from any or all of the connection units 47 in an equal manner. The base node 36 may be adapted to auto compose the media content on the central display 44 connected to it, e.g. from one or more processing devices 31.

An independent aspect of the present invention is at least one connection unit 47, (optionally 49 for receiving or optionally connection unit 52) adapted to communicate the user selected arbitrary media content to said base node 36. Preferably the connection units 47 and/or optionally 49 or optionally connection unit 52 are physical plug-and-play devices. An example of a connection unit is shown schematically in Fig. 10.

The connection unit 47 be may integrated into a user processing device 31, e.g. as an internal peripheral device or may preferably be an external peripheral device comprising a connector adapted to couple to a port of a user processing device 31. The processing device 31 may have a client display, a processing engine such as a microprocessor, a memory and an operating system. The optional connection unit 49 may be integrated into the base node 36, e.g. as an internal peripheral device or may be an external peripheral device comprising a connector adapted to couple to a port of the base node 36. The connection unit 49 may be fully integrated into the base node 36, e.g. is an internal network interface of the base node 36. The base node 36 may have a

processing engine such as a microprocessor, a memory and an operating system.

The user processing devices 31, the connection units 47, (optionally 49 or optionally connection unit 52) and the base node 36 co-operate to form a communication network 50 for linking between at least one of the plurality of processing devices 31, 36 and 35 and the central display device 44. The communication network 50 is adapted to receive arbitrary media content from at least one of the plurality of processing devices 31 and to transmit the arbitrary media content of at least one of the plurality of processing devices to the central display device 44.

An independent aspect of the present invention is a portable application 60 adapted to be loaded onto a client processing device 31 and to be run on the operating system of the client processing device 31. The portable application 60 runs as a process on the client processing device 31 that is adapted to deliver an arbitrary media content from the client processing device 31 to the communication network 50 in response to a user action applied to an input device 48, the process leaving a zero footprint on termination on the client processing device 31. Optionally the portable application 60 is stored on each connection unit 47 and optionally 49. Preferably the portable application 60 is adapted to "screen scrape" content of the client display of the client processing device 31. Optionally the portable application 60 when run on a processing device 31 is adapted to "screen scrape" content of the client display of this client processing device 31 and to transmit it via a connection unit 47. Optionally the portable application 60 when run on the processing device is adapted to "screen scrape" content of the client display of the client processing device 31 and to transmit it via a network interface of the processing device 31, for example if the connection unit 47 has no transmitter or this is not functioning.

The connection unit 47 for communicating with said base node 36 has a network interface e.g. comprising a transmitter 62. The transmitter 62 is preferably a transceiver. Optionally the transmitter/receiver can be a wireless transmitter/receiver.

The base node 36 for communicating with the connection unit 47 has a receiver 63 which can be included in the connection unit 49 or integrated into the base node 36.

The receiver is preferably a transceiver. Optionally the transmitter/receiver can be a wireless transmitter/receiver.

The input device 48 allows a user interaction with the connection unit 47. Preferably the input device 48 is physical actuator coupled to the connection unit 47. The user action applied to the input device 48 generates a signal that can trigger transfer of data from the processing device 31 (to which the connection unit 47 is coupled) to the network 50. Preferably the input device 48 has an activating surface that is between 100 and 14,400 square mm. Optionally, the input device 48 can be a key displayed on the client display 1 of a client processing device 31. This key can be activated, e.g. by use of a pointing device such as a mouse trigger transfer of data from the processing device 31 to the network 50.

The connection unit 47 is preferably provided with a visual indicator 61, e.g. for allowing user feedback from the connection unit 47 of the status of any activity.

The system also can include a server program 64 adapted to be loaded onto the base node 36, said program 64 being adapted to receive arbitrary media content from one or a plurality of client processing devices 31 through said connection units 47, (optionally 49 or 52), and to show this plurality of arbitrary media content streams on one or a plurality of displays 44. The server program 64 may be adapted to allow display in accordance with one or more rules, e.g. FIFO, automatically, on request, forced, in accordance with a priority etc. To execute the rules, the server program 64 may have a decision module.

Preferably, the server program 64 is adapted to treat media content passed to it from any or all of the connection units 47 or 52 in an equal manner. The server program 64 may be adapted to auto compose the media content on the central display 44.

The server program 64 may be a portable application adapted to be loaded onto the base node 36 and to be run on the operating system of the base node 36. The portable application 64 runs a process on the base node 36 that is adapted to display an arbitrary media content received from the client processing device 31 via the

communication network 50, the process leaving a zero footprint on the base node 36 on termination. Optionally the portable application 64 is stored on each connection unit 49 and optionally 47 and can be installed therefrom.

The system may also include a central display device 44 and optionally a whiteboard 45 or other display means such as a printer. The display 44 being adapted to receive user selected arbitrary media content, and may be adapted to allow display of the received user selected arbitrary media content in accordance with one or more rules, e.g. FIFO, automatic, forced, on request or approval, in accordance with a priority etc.

Optionally, one of the connection units 47 can be adapted to be a master connection unit. Such a master connection unit may be adapted to instruct the base node when media content from a client processing device 31 may be displayed or which of the processing devices may be allowed to send content for display.

In embodiments of the present invention, at least one portable application is used, e.g. for the client software on a client processing device 31 or optionally on the base node 36. In these embodiments, one of the pre-installed generic drivers of the operating system on the relevant computer device 31, 36 is exploited for setting up communication from the computer device 31, 36 to the network 50 via the connection unit 47, (optionally 49). The generic driver is used in connection with the connection unit 47, (optionally 49) operating as a peripheral device but the use can go beyond that of the standard class of peripheral devices for which the generic driver is intended. In some embodiments the connection unit 47, (optionally 49) operated as a peripheral device communicates with the relevant processing device 31, 36 by using a generic communication protocol provided by the pre-installed generic driver. Pre-installed USB drivers are examples. Preferably the setting up of the communication of network 50 using connection unit 47, (optionally 49) does not alter or affect the networking capability of the relevant processing device 31, 36. For example, if a browser is started on the client processing device 31, this browser can use the standard network interfaces on the processing device 31. This means that transfer of data via the connection unit 47 (optionally 49) is independent of transfer of data over the network interfaces of processing device 31 or 36. This has the advantage that each user can

carry out processing such as searching on the internet to gather data independently of the transfer of data to be displayed during a meeting, or receive emails etc.

The use of a portable application has the advantage that any modification to settings in the register or generally in the operating system can be avoided, so that upon any form of termination, e.g. disconnecting the electronic device, system crash, no trace is left. This is generally termed "zero footprint".

The present invention has the advantage of scalability. It can provide a display system for use by a plurality of users in meetings. Every user in the meeting thus can have a client processing device 31 for coupling to a connection unit 47. A first user action connects the client processing device 31 to the base node 36, e.g. by inserting a connection unit 47 into the relevant interface connector on the processing device 31, e.g. a USB interface. A second user action comprising activating a button or key on the input device (e.g. by depressing it) then starts the process of transmitting arbitrary media content from the client processing device 31 to the base node 36. This process preferably includes screen scraping data from the processing device. Using screen scraping avoids special programs being installed on the base node 36 to carry out graphical commands sent from the processing device 31. When the base node 36 receives the plurality of arbitrary media content, it can allow auto composition of this media content on the central display connected to it.

The present invention will now be described further with reference to certain more specific embodiments.

With reference to Fig. 2, the base node software (6) running on a base node 36 can be adapted to display on the central display a splash screen (21) showing its readiness to receive arbitrary media content over its receiver. This splash screen (21) can also show instructions on how to use the system, as well as the configuration parameters (see later) to reach the base node 36. These configuration parameters are also shown in a transparent canvas at the bottom of the central display (22).

A client processing device 31 that wants to have its arbitrary media content displayed

on the central display connected to the base node 36 is connected to a connection unit 47. The portable application 60 will be executed on the client processing device 31 as a host device. A first user interaction creates a connection between the portable application 60 and the base node 36 using the transmitter in the connection unit 47 and the receiver in the base node 36. The first user interaction can be the connection of the unit 47 to the client processing device 31. A second user interaction, this time on the input device 48, activates screen scraping by the portable application of the arbitrary media content from the client processing device display, which is then sent over the connector unit 47 to the base node.

The base node 36 receives the plurality of arbitrary media content coming from one or more connection units 47, and auto composes this media content for rendering on the central display.

The visual indicator 61 on the connection unit 47 indicates to the user and to other participants in the meeting that media content is being sent by that connection unit 47 to the base node 36 for display.

Repeating the second user interaction on the input device 48 of a connection unit 47 decouples the media content from that connection unit 47 from the base node 36. The base node 36 removes that media content from the composed image on the central display and recomposes the remaining content on the central display.

The content on the central display/projector is auto arranged as shown in figure 2. When user 1 adds content, his/her display will be scaled to fill the available central display canvas as much as possible, but without affecting the aspect ratio. When user 2 adds in, his content is added to the side of the first image. When user 3 adds his content, the arrangement is, for example, triangle wise. Adding user 4, the image becomes a 2 by 2 tiling, which is the maximum available. When an additional user attempts to add content, he will be blocked. When a user initiates action to remove his/her content, his/her media content is removed from the central display and one moves backward in the composition sequence shown in figure 2.

Base node software

The base node software has one or more of the following features:

- First code for providing a means or a method step for correctly configuring the receiver of the base node.
- Second code for providing a means or a method step for listening for output of connection units trying to connect on a specific port.
- Optionally, third code for providing a means or a method step for a GUI for administration purposes, offered for example over a web interface.
- Optionally, fourth code for providing a means or a method step for publishing its presence over the network using the zeroconf protocol.
- Optionally, fifth code for providing a means or a method step for accepting and installing software updates of the base node as well as for the portable application software for the connection units.
- Sixth code for providing a means or a method step for providing facilities for pairing of connection units to the base node.
- Seventh code for providing a means or a method step for auto-composing of different incoming arbitrary media streams and rendering of composited image on display or projector screen.
- Eighth code for providing a means or a method step for receiving, decrypting and decoding incoming arbitrary media content.
- Optionally ninth code for providing a means or a method step for scaling of incoming arbitrary media streams
- Optionally tenth code for providing a means for displaying incoming arbitrary media content in accordance with a set of one or more rules.

Any of the above code may be stored on a non-transitory machine readable storage medium such as an optical disk, a magnetic disk, magnetic tape, solid state memory, USB mass storage device etc.

Portable application for the client processing device

The portable application comprises an algorithm for screen scraping. Screen scraping algorithms include VNC and RDP or similar. The algorithm may include a

combination of algorithms such as VNC and RDP that are optimized for different content, e.g. static text or video. The portable application has one or more of the following features:

- Eleventh code for providing a means or a method step for connecting to a network including the base node.
- Twelfth code for providing a means or a method step for capturing video frame buffers of the client processing device, i.e. computer (C), also called screen scraping.
- Thirteenth code for providing a means or a method step for encoding, compressing and optionally encrypting these video frames and sending them over a secure link to the base node. Only changed areas such as rectangles or triangles of the screen (or other suitable geometrical shapes) need to be transferred, and different types of rectangles or triangles are encoded in different ways (e.g. RLE, JPEG,…) to optimise performance.
- Fourteenth code for providing a means or a method step for handling the connection unit.
- Fifteenth code for providing a means or a method step for initiating connection to base node.
- Sixteenth code for receive inputs from the input device on the connection unit.
- Seventeenth code for providing a means or a method step for sending state changes to the visual indicator on the connection unit.
- Optionally, eighteenth code for providing a means or a method step for presenting the user a GUI (18).
- Optionally, nineteenth code for presenting GUI for administration of the portable application.
- Optionally, twentieth code for providing a means or a method step for displaying and activating a key on the display of the client processing device for allowing a user input to start the transfer of data from the client device to the base node.

Any of the above code may be stored on a non-transitory machine readable storage medium such as an optical disk, a magnetic disk, magnetic tape, solid state memory, nand Flash etc.

In this embodiment the portable application stored on the connection unit, and is executed in an execution context on the client processing device. The portable application does not need to be copied to or installed on the computer. It can be executed directly from the connection unit. It will only be copied temporarily into an execution context on the client processing device. There are also no changes in configuration required or settings in the client processing device. This means that nothing will remain on the client processing device when the connection unit is removed. It also implies that the portable application will run on client processing devices where the user does not have the necessary access rights to install software.

The portable application is designed in such a way that

- No specific drivers need to be installed on the client processing device.
- Pre-installed drivers are used, e.g. for classes of peripheral devices.
- It is independent from vendor specific graphics hardware.
- It runs on at least one and preferably on a variety of different client processing devices, including Windows, Mac OS/X, Linux, Android, iOS and many others.

Advantages

The present application has one or more of the following advantages:

- No need for a master role in the meeting
- Standard plug and play connectivity of connection units to base node
- Simple and well known user actions are employed
- Own networking facilities of client processing devices not blocked
- No configuration changes on the client processing device
- Input devices are easily accessible; e.g. large size
- Program updates of portable application and server program can be performed locally
- Portable applications are used, no installation, multi-platform, no vendor specifics
- Particular implementation of screen scraping done by portable application

avoids vendor specific graphics devices
- Standard drivers are used so no drivers have to be installed
- No configuration changes on the client processing devices
- Zero footprint applications on client processing devices – nothing to clear up or adjust or reset
- Own networking facilities of client processing devices not blocked
- No configuration changes on the user computers
- Low virus, malware and spyware risk

The portable application may be stored on a non-transitory machine readable storage medium such as an optical disk, a magnetic disk, magnetic tape, solid state memory, nand Flash etc.

Second Embodiment

In the second embodiment, referring to Figs. 2 to 5, the base node is a separate physical processing device called base unit (B), comprising permanent storage, memory, a processing engine, a wireless access point (4), a plug and play interface such as a USB port (11), a graphics display output adapter (5) like VGA/DP/DVI/HDMI, and optionally an audio output adapter (27). An input device having an actuator such as a button 13 and a visual indicator 14 are optional.

The connection unit is a physical device in the form of an external peripheral device (shown in the drawings as a "dongle" D) comprising permanent storage storing the portable application (7) and configuration parameters (12), memory, a processing engine (e.g. CPU, FPGA), a wireless transmitter such as WiFi (3) or other wireless transmitters such as LiFi, a plug and play interface such as a USB interface (2), a button as input device (9), an LED ring as visual indicator (10). The portable application is stored on the peripheral device (7).

The client processing device is host device, for example a computer or laptop comprising a display, a plug and play interface such as a USB port (2), memory, and a processing engine such as a microporcessor.

The system thus comprises

- an external peripheral device (D) that has a plug and play interface such as a USB interface (2) on one end and a communications interface such as a wireless interface configured as client (3) on the other end.
- a base unit (B) that has a communications interface such as a wireless interface configured as access point on one end (4) and a video card adapter (5) like VGA, DVI, DP or HDMI on the other end.
- a portable application (7) stored on the peripheral device (D) but executed on the client processing device (C)
- a base node software (6) stored and executed on the base unit (B)

The external peripheral device (D) also preferably has any one or any combination of:

- a large button as actuator for the input device (9) allowing user interaction with the peripheral device. The button preferably has an actuation surface area of between 100 and 14,400 square mm.
- visual indication such as a LED (10) allowing user feedback from the peripheral device. The user feedback can be in the form of a light ring.

An advantage of embodiments of the present invention is to provide data transfer to the peripheral device via a peripheral interface such as a USB interface on any processing device such as a computer in a manner that is largely operating system independent and without leaving a footprint (Zero-Footprint). Installation of drivers and/or applications onto such a processing device as a computer is not necessary wherever pre-installed generic drivers are present. Administrator rights on the processing device such as a computer are preferably not necessary. To avoid the need for administrator rights, embodiments of the present invention use other peripheral device pre-installed drivers such as USB class drivers supported without any extra installation. Embodiments of the present invention route at least screen scraped data presented by client software running on the processing device for transfer to a communications network via a peripheral device such as a USB device. This bypasses any network interface of the processing device C (and hence many firewalls) but only

for the specific client software. Other applications are not affected and can make use of the standard network interfaces, i.e. packets from/to the TCP/IP stack are transferred to a network device as normal. The client software is launched from the peripheral device such as a USB composite device or storage device as a portable application, which can avoid that any traces are left on the host OS.

Basic usage scenario of the second embodiment

The base node software (6) displays on the projector a splash screen – (21) in figure 5 - showing its readiness to receive arbitrary media content over its receiver (4). This splash screen (21) also shows instructions on how to use the system, as well as the configuration parameters (see later) to reach the base node. These configuration parameters can also be shown in a transparent canvas at the bottom of the central display (22).

To avoid user interaction for the configuration of the connection between peripheral device and base unit, a pairing process is used. This pairing process provides the peripheral device, i.e. the connection unit with networks parameters needed to set up the local network. As an example, the peripheral device can be briefly plugged into the USB port (11) of the base unit (B). The base unit then optionally does a software validity check, optionally does a software update of the portable application stored on the peripheral device, and writes the connection parameters on the peripheral device (D) required for the peripheral device and base unit to find each other to the permanent storage (8). For example, when using WiFi, this would be the SSID, WEP/WPA2 keys and IP address of the base unit's receiver, as well as the port number used by the base node software although not all of this data is necessarily exchanged.

A client processing device that wants to have its arbitrary media content displayed on the central display connected to the base node (5) connects a peripheral device (D) to its USB port via (2). The peripheral device presents itself to the computer over interface (2) as a composite device comprising a mass storage device and a keypad. This has the major advantage that no specific driver is required, since all these devices are natively supported in every personal computer system that has a USB port. If

autorun is enabled, then the computer will automatically execute the client software (7) stored in mass storage (8) on the peripheral device. The first user interaction mentioned in the general case is then just the connection of the peripheral device to the USB port. If security measures disabled auto-run, the user needs to explore the mass storage on the mass storage of the peripheral device and start the portable application manually.

The portable application will use the wireless, e.g. WiFi or LiFi interface of the peripheral device (3) to connect to the correct base node. To know the right base unit to connect to, the configuration parameters needed to make this connection are stored in the database (12) on the mass storage device (8) during the pairing process described earlier.

Once the connection is made, the peripheral device goes into connected mode. This means that there is now at least one channel from the peripheral device to the base unit. The content is not shown yet. The LED (10) on the peripheral device now turns white to give a visual indication of this new state.

When the user at the computer (C) wants to show her content, she presses the button (9). When the button was previously in state “connected” (see figure 6), it will check the state of the base unit (P). If the base unit is not in state “full”, the peripheral device will send the screen scraped arbitrary media content to the base unit (B), which will add the media content to the composition on the central display. The peripheral device LED (10) now turns red to indicate “showing” state (figure 6).

The button (9) acts as a toggle. When the user presses the button again, that computer displays content will be removed from the projector. The LED (10) goes back to white.

Use of the auto-run feature is optional if possible and enabled on the computer (C) to start the client software (7) as soon as the peripheral device is plugged in. On Windows for example, this means mounting the peripheral device as a mass storage device and using the autorun.inf file stored on the peripheral device.

In many cases however, this auto-run feature will be disabled for security reasons. In that case, we will, if possible and enabled on the computer (C), use the auto-play feature to show the logo of the connected peripheral device on the desktop of the computer. The user then needs to double click on that logo to start the client software. If the auto-play feature as described above is also not possible or enabled, the user must browse to the file system of the connected peripheral device and start the application manually. This means double clicking the client.exe file on Windows, client.app on Mac OS/X or tapping the appropriate application icon on a tablet or any mobile device with touch screen.

Third Embodiment: Portable application stored on standard solid state memory such as a USB stick.

In the third embodiment, the portable application is stored on a solid state memory such as a regular USB memory stick (figure 7).

With a solid state memory such as a regular USB memory stick, there is no input device, visual indicator or transmitter of the kinds described above for the connection unit. This means that the system needs to:

- Use the transmitter/receiver from the client processing device.
- Use as input device a key or button on the client processing device like a physical key on the keyboard, a special mouse press, a button area on a touch screen, a button displayed on the screen to be clicked on with a mouse pointer.
- Present the visual indicator on the client processing device's display.

The client processing device then looks like figure 8.

This embodiment provides a peripheral interface such as the USB interface on any processing device acting as a host device such as a computer in a manner that is largely operating system independent. Installation of drivers and/or applications onto such a processing device as a computer is not necessary wherever pre-installed generic drivers are present. Administrator rights on the processing device such as a computer are preferably

not necessary. To avoid the need for administrator rights, this embodiment uses other peripheral device pre-installed drivers such as USB class drivers supported without any extra installation. This embodiment of the present invention routes at least screen scraped data presented by client software running on the processing device for transfer to a communications network via a network connection of the processing device. The client software is launched from the peripheral device such as the USB device as a portable application.

The first user operation then comprises:

- plugging in the solid state device such as a USB memory stick,
- starting the portable application (if autorun is disabled)
- configuring the transmitter, such as a wired or wireless network interface, on the client processing device to connect to the correct base node, using the configuration parameters (22) shown on the central display
- triggering the connection of the portable application with the base node, for example by interacting with an element on the GUI (18) of the portable application presented on the display of the client processing device.

Presenting visual feedback on user actions is in this embodiment also done using elements in the GUI of the display of the client operating device.

In this embodiment, the advantage of zero footprint is partly realized by the portable application in the sense that no software is installed on or copied to the client operating device, but there is a configuration change needed to connect the transmitter of the client operating device with the base node, which needs to be undone afterwards.

Optionally, the portable application can make the configuration changes to the transmitter for the user automatically in the background.

Advantages lost in this embodiment

- Partial loss of zero footprint nature of portable application
- More complex first user interaction
- More expertise required from user
- GUI needed on client operating device display, which is possibly also shown on

central display

- Need to find free key on client operating device when using physical key for second user action
- Network interface is blocked from other uses by portable application

Optionally, the last point can be avoided by using the base unit as a gateway to the network that the client operating device wanted to connect to through its own interface.

Advantages are:

- tight control of user connectivity to corporate network through settings on the base unit
- keep network connectivity intact even when transmitter is now also used for display purposes

Disadvantage is a higher vulnerability of the system because the display connection is now possible a doorway into the corporate network.

What remains as advantages are

- the availability of a physical medium to distribute the portable application to users
- no need to install or copy software to client operating device
- easy way to maintain software updates on the connection units (here: memory sticks) via the base unit
- possibility to write configuration data on the connection unit by the base unit, for example in the form of a configuration profile that can be read and used by the client operating device

Fourth Embodiment: Software only client installed on the client processing device.

This embodiment is similar to the third embodiment, with as only difference that the software is copied on the client operating device (figure 9). In this case, no plug and play port such as a USB port is required on the client operating device.

This embodiment will typically be used for tablet PC's and mobile devices. In that case

- there is often no USB port available

- application distribution is easy and widely accepted through application stores

Fifth embodiment: Base node software OEM'ed to projector or display equipment

In this embodiment, the base node is not realized as a separate physical box, but integrated into the processing unit inside a display or projector. All other details are as previously described.

Sixth embodiment

In this embodiment, the base node is not realized as a separate physical box, but integrated into the codec of a video conferencing equipment. All other details are as previously described.

Seventh embodiment: Remote meeting participant

In this embodiment, one or multiple client operating devices are not in the direct vicinity of the base node but on a remote location.

To accommodate this case, the following adaptations are needed:

- further compression and or scaling of the arbitrary media content to allow use of low bandwidth connection
- possibility to communicate connection parameters of the base node to a remote user
- connectivity of the base node to the WAN network to which the remote user is connected

All other details are as previously described.

Eighth embodiment: multiple base nodes

In this embodiment, multiple base nodes are used. This can be done for different purposes:

- connectivity of multiple central displays
- extension of real estate of central display

- connectivity of base nodes in different remote locations

This provides the advantage that one can present on multiple base units from a single peripheral device. This is useful for a number of cases:
- personal peripheral device: user can have a personal peripheral device that is paired with multiple meeting rooms that he regularly uses
- use in meeting room with multiple base units each controlling a different display in the same meeting room

The proposal uses a special variant of the peripheral device called a multi base peripheral device. The multi base peripheral device is equipped with a rotating wheel around the circular central "show me" button. This could be a mechanical rotating multi-position switch or something like the touch wheel on the iPod classic.

The pairing of this multi-base variant of the peripheral device:
- the rotation wheel is put in the position of the corresponding base unit.
- the peripheral device is paired to the base node in the regular way
- the configuration parameters are stored in a permanent storage location; every position of the rotating wheel has a corresponding set of connection parameters (e.g. different rows in a table) each corresponding with a particular base

The connection of the peripheral device is as follows:
- multi-base peripheral device X is plugged into a PC
- rotation wheel on peripheral device X is put in position A
- peripheral device X reads configuration parameters in position A of its internal memory
- peripheral device X connects to base node A
- base node A indicates connection of multi-base peripheral device X on central display screen
- rotation wheel on peripheral device X is put in position B
- peripheral device X reads configuration parameters in position B of its internal memory
- peripheral device X connects to base node B
- base node B indicates connection of multi-base peripheral device X on screen
- continue until correct base is selected with rotation wheel
- click the peripheral device input device e.g. button to show content on central display of

base node
- rotating the wheel always first clicks away content from the base of the last position

Ninth embodiment

Fig. 10 shows a peripheral device 47 in accordance with an independent embodiment of the present invention including an input device. This embodiment can be used with any of the embodiments described above.

The peripheral device is configured as a connection unit and is a physical device in the form of a connector for a plug and play interface of a user processing device as a host computer such as a USB connection, a flexible data and power connection connected to the connector and a base, the base having an actuator, e.g. a button configured to be an input device with the functions as described above.

The base and/or the actuator is preferably large in size, e.g. having a surface area between 100 and 14,400 square mm. The base can be square, rectangular, round, hexagonal, oval, polygonal in shape or any other ergonomically suitable shape. The actuator is preferably round but can be square, rectangular, hexagonal, oval, polygonal in shape etc. there can be more than one actuator on one base.

The length of the flexible data and power connection, e.g. cable is preferably adapted to place the peripheral device (when in its connected in its operating position), especially the base and the actuator, in the region between the boundary of the connected user processing device and the ergonomic boundary as defined above. In addition the flexible data and power connection should be adapted so that the base lies flat on the meeting table independent of the orientation of the connector needed to insert the connector into the plug and play interface.

The base preferably includes electronics such as having permanent storage for storing the portable application and the network configuration parameters, memory, a processing engine (e.g. CPU, FPGA), a wireless transmitter/receiver such as for WiFi or LiFi, a plug and play interface such as a USB interface, a LED ring or strip as visual indicator. The portable application can be stored on the peripheral device, i.e. in the base. The visual

indicator is for allowing user feedback from the connection unit of the status of any activity.

- Some examples for activation of the actuator which can be used with any of the embodiments of the present invention:

    - Sound activated (hand clap, voice recognition, computer sound, music, …)
    - Remote controlled via wireless connected device (IR, Bluetooth, WiFi, LiFi…)
    - Light activated
    - Pressure activated, e.g. depression with a finger or hand.
    - Touch activated
    - Proximity ('near-touch' on the actuator or bringing the actuator close to some object
    - Biometric reader such as Fingerprint reader, Iris scanner, DNA analyser
    - Keypad, e.g. for entering Keycode e.g. a password

Alternative embodiments

In the above embodiments, once the connection is made between the connection device and a host computer, the peripheral device goes into connected mode. This means that there is at least one channel from the peripheral device to the base node. In accordance with any of the embodiments of the present invention a plurality of channels can be set up between the connection device and the base node. These channels may be logical channels.

Some examples for such a multichannel arrangement may include the first and one or more of the additional channels:

- First channel is for the Scraped image stream (XDS)
- Second channel is for GPU commands (OpenGL, DirectX)
- Third channel is for Mouse pointer coordinates (absolute, relative)
- Fourth channel is for Mouse pointer icons
- Fifth channel is for Image data files (JPEG, PNG, GIF, …)
- Sixth channel is for Multimedia data files or streams (MPEG2, MPEG4, OGG, H.26x, …)

- Seventh channel is for Audio data files or streams (MP3, MP4, AAC, WMA, …)
- Eighth channel is for text or Document data files (DOC, DOCX, PPT, PPTX, ODT, ODS, PDF, …)
- Ninth channel is for transmission of a priority value 1,2, 3… as described above.

The support of audio, as discussed above when providing a seventh channel, in "screen scrape" like applications is non-trivial. When using devices which comprise a Windows OS, a large variety of audio devices exist, each offering a separate API. On devices comprising a Mac OS, special drivers like for instance SoundFlower needs to be installed. SoundFlower is a Mac OS X (10.2 and later) system extension that allows applications to pass audio to other applications. Hence such programs do not meet the zero footprint requirements.

The present invention provides in embodiments a method and a system for connecting a processing device such as a laptop, smartphone, PDA, computer, tablet and suchlike to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices. The method and/or system are adapted for:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;
b) setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
c) coupling the processing device to a communications network via the peripheral device;
d) routing audio data between the processing device and the communication network via the means for communication, wherein the generic communication protocol is used for transferring the audio data between the processing device and the peripheral device.

In particular the method and/or system can be adapted for:
a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;

c) coupling the processing device to a communications network via the peripheral device;

d) routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

Embodiments of the present invention advantageously use the availability of a plug and play interface such as a USB interface. A USB device is connected to a suitable port on the processing device. . For example, on every PC-like platform, there is standard built-in support for a USB audio device. Thus there is a standard generic audio driver available. Using this audio interface is thus possible without special driver installation.

On the peripheral device in embodiment of the present invention one can implement a virtual audio device. This peripheral device can present itself as an audio out device to the processing device such as a laptop, PDA, laptop, smartphone, tablet, PC, etc it is connected to. As soon as the peripheral device is plugged in, the user of the processing device will see an additional audio out interface displayed on the processing device display to which it can stream the audio. Audio configuration advantageously can be done using the standard audio interface GUI on the processing device. The peripheral device can present itself as a USB composite device.

The virtual audio device on the peripheral device is preferably adapted to analyse the incoming signal. If no audio is received, the incoming signal is discarded. If audio is received, the peripheral device preferably will initiate an additional TCP/IP socket connection to the base unit and the communications network. The audio can be then optionally time-stamped synchronous with the video stream for lip synchronization, optionally encoded into for instance Orgg/Vorbis, optionally encrypted using for instance CryptoPP and sent over the TCP/IP link using the RTP/RTCP protocol. If no audio signal is received, then no audio packets will preferably be sent over the network to limit bandwidth usage. The audio channel over TCP/IP is disconnected synchronously with the

video channel.

In an embodiment of the present invention, the base unit is adapted to receive the audio stream packets for instance encoded in RTP and controlled with RTCP over a TCP/IP socket. It will preferably then decrypt and decode the contained encoded audio stream if required, and deliver the resulting signal to the physical audio device in the base unit. The embedded time stamps can be used to synchronize the audio and video streams.

When audio is present on the client processing device to which the peripheral device is connected and made available to the USB audio device presented by the peripheral device, then it will be streamed to the base unit. The base unit is notified that the additional multimedia stream presented to it contains audio. This additional meta-information is used in the auto composition engine on the base unit. Without audio, up to four such streams can be handled for example by the base unit simultaneously.

Thus, instead of "scraping" the audio like e.g. prior art products do, embodiments of the present invention provide a channel, as described above, which is adapted to capture the audio on the peripheral device using only standard drivers and not requiring any software installation in or on the processing device. The peripheral device preferably acts as a composite device comprising for instance a (virtual) audio speaker device. However instead of operating like a speaker the audio is channelled over the communications network. The peripheral device can preferably capture the audio stream with a device driver, for instance a built in ALSA UAC1, and stream the audio to the base unit. In addition, to provide lip synchronisation, embodiments of the present invention further provides a timer or uses a timer present in a processing device that preferably time stamps both the audio and the video stream. This time stamp is encoded in the video frames and passed on in the ALSA communication stream to the peripheral device. The peripheral device then encodes this time stamp into the audio stream (for instance RTP audio stream) that is streamed to the base unit. At the receiving end, the audio and video streams are then preferably recombined taking into account the time stamp to reach lip synchronization.

A detailed embodiment of the present invention for audio capture will be described with reference to Fig. 11.

In this embodiment a peripheral device 32 as described above is used that can be coupled with a processing device 31 such as a laptop, tablet, smartphone, PDA, personal computer etc. The coupling can be by a plug and play interface such as a USB interface that has generic drivers installed on the processing device. For example the peripheral device 32 can be physically inserted into a USB port on the processing device 31. Commercially available processing devices currently support external USB audio devices through a generic built-in USB audio software driver. In the future any modifications, improvements or replacements of universal interfaces will have an equivalent audio solution. The generic drivers installed on the processing device make the audio available at the port 8 to the peripheral device 32. For example, port 8 can be a USB port using a standardized interface, e.g. mostly UAC1. On the peripheral device 32 there is a matching port 11. In accordance with this embodiment audio data is captured at this interface 8-11 internally in the peripheral device 32. This data is then optionally re-encoded and streamed to the communications network to which the peripheral device 32 has access. An example is a wireless communications network such as WiFi or LiFi. The communications network has a base node which can be in the form of a base station or base unit 33. The base unit can be a central base unit for use in meetings. For use in displaying a presentation this base unit is coupled to a display device as described for other embodiments of the present invention. In order to provide lip synchronicity, the audio and video signals captured are provided with a high resolution time stamp upon packaging. By doing so, the combined audio and video signals can be reconstructed at the receiving end regardless of the paths and delays of the different packets.

For the processing of video data from the processing device 31, a software 2 is executed on the processing device 31 e.g. a client PC, i.e. a screen scraping software as described in the other embodiments. This software 2 can be stored as a software program 30 in mass storage 12 on the peripheral device 32 as described in the other embodiments. This software program 30 is loaded onto the processing device 31 when it is coupled thereto, either automatically or by user action as described in the other embodiments. When the software 2 is running on the processing device 31 it is preferred if it leaves zero footprint on termination has been described for other embodiments. That software 30 when executed on the processing device 31 captures the video data that is available on the processing device, e.g. from a presentation or video that is running on the processing device as described in the other embodiments. For example, the software 30 when executed on the

processing device 31, is adapted to screen scrape, e.g. to read one or more video frame buffers 1 from the graphics card in the processing device 31. Generally the processing device 31 will have its own display and hence will have a graphics card or something equivalent with a buffer for storing video data. This read video information is preferably time stamped with a clock 9, to be able to later synchronize the captured video signal with the related audio signal. The video signal is then encoded in a video encoder 3, packetized in a video packetizer 4, prepared in an HID protocol packetizer 5 for transport over the plug and play interface using a generic driver 10, such as over a USB interface using generic pre-installed drivers, e.g. a generic pre-installed Human Interface Driver (HID). The audio data is offered on the plug and play port e.g. the USB port 8.

On the peripheral device 32 the video packets are received at the corresponding plug and play port, e.g. the USB port 11, read by the Human Interface Driver (HID) interface handler 13, unpacked to remove HID protocol headers in an unpacker 20 and then transmitted to the communications network by a transmitter 21. The network can be wireless for example WiFi or LiFi network.

Having been routed over a communications network to the base unit 33, the incoming stream is read from the communications interface such as a WiFi access point 22, unpacked in an unpacker 25, decoded in a decoder 26 and then inserted into a suitable composition such as an OpenGL based composition in the compositor 29 for display on a central display device.

With reference to the audio data on the processing device 31 such as a client PC, the audio is sent over a port using generic drivers such as over a USB port 8 using the standard built-in generic audio driver such as UAC driver 7. On the peripheral device 32, the audio packets are read from the generic port, e.g. USB port 11 by a dedicated audio device 14. These packets are then processed by any of a mixer a rate converter, an echo canceller, noise canceller or similar. Any of the mixing, rate conversion, echo cancelling, noise cancelling can be executed using an ALSA driver 18. The ALSA driver offers the packets to a dummy audio device 16 such as an audio scraper. In this audio device 16 the audio packets can be time stamped from the clock 15 that can be synchronized with clock 9 of the processing device 31. This information is then encoded in an encoder 17 and packetized in a packetizer 19]before being transferred to the communications network. The

network can be a wireless network such as a WiFi or LiFi network For this purpose a suitable transmitter 21 is provided in the peripheral device 32. On the base unit 33 the audio information stream is recovered at a suitable communications interface such as the WiFi access point 22. The audio is then unpacked in an unpacker 23, decoded in a decoder 24 before being before being offered to an audio mixer 28. In oder to synchronise the audio and video streams these are both sent to a synchronizer 27 in which the two streams are synchronized and thus keep lip synchronization.

In the above embodiments, a particular method of pairing the peripheral device with the base node has been described. Any of the embodiments of the present invention may include other pairing mechanisms of which some examples are given below.

- Some examples for pairing
    - Plug in the peripheral device, to a generic peripheral device port such as a USB port of the base node or other USB enabled device. Pairing info is transmitted over the generic peripheral interface such as USB.
    - The Signal strength of the wireless channel to the base node is used to identify which base nod is to be used
    - The Signal strength of the wireless channel or any other channel. Example is an NFC/RFID transmitter can be provided underneath the meeting room table. Putting the user processing device such as a laptop and the peripheral device plugged in on this table automatically pairs the peripheral device with the base of this meeting room
    - Manual pairing (e.g. by entering IP address, hostname, wireless ID (like SSID on WiFi))

What is claimed is

1. A method for connecting a processing device to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the method comprising:
a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;
b) setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;
c) coupling the processing device to a communications network via the peripheral device;
d) routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

2. The method of claim 1 wherein Step b) comprises presenting the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

3. The method of claim 1 wherein Step b) comprises presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

4. The method of claim 1 wherein Step b) comprises presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

5. The method of any of claims 1 to 4 wherein a client application is stored on the peripheral device which when run on the processing device obtains screen scraped data.

6. The method of claim 5 wherein the client application is a portable application.

7. The method of any of the claims 1 to 6 wherein the peripheral device is adapted to analyse an incoming signal from the processing device and if no audio is received, the incoming signal is discarded.

8. The method of claim 7 wherein if audio is received, the peripheral device will initiate an additional connection to the base unit through the communications network.

9. The method of any of claims 1 to 8 further comprising time-stamping synchronously with the audio with the data stream.

10. The method of claim 9 further comprising encoding, optionally encrypting the audio data.

11. A system for connecting a processing device to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the system comprising:
a) means for coupling a peripheral device to the processing device, the peripheral device having a transceiver;
b) means for setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and the processing device;
c) means for coupling the processing device to a communications network via the peripheral device;
d) means for routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

12. The system of claim 11 further comprising means for presenting the peripheral device to the processing device as a human interface device and wherein the pre-installed generic

driver is a human interface device driver.

13. The system of claim 11 further comprising means for presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

14. The system of claim 11 further comprising means for presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

15. The system of any of claims 11 to 14 wherein a client application is stored on the peripheral device which when run on the processing device obtains screen scraped data.

16. The system of claim 15 wherein the client application is a portable application.

17. The system of any of the claims 11 to 16 wherein the peripheral device is adapted to analyse an incoming signal from the processing device and if no audio is received, the incoming signal is discarded.

18. The system of claim 17 wherein if audio is received, the peripheral device will initiate an additional connection to the base unit through the communications network.

19. The system of any of claims 11 to 18 further comprising time-stamping synchronously with the audio stream with the data stream.

20. The system of claim 19 further comprising means for encoding, optionally encrypting the audio data.

21. An electronic meeting tool for use with the system according to any of the claims 11 to 20 and for communicating arbitrary media content from users at a meeting comprising:
a node configuration means adapted to operate a display node of a communications network, the display node being coupled to a first display, the node configuration means being adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display; and

at least one peripheral device adapted to communicate the user selected arbitrary media content via the communications network, wherein the peripheral device is a connection unit comprising:

(a) a connector adapted to couple to a port of a processing device having a second display, a memory and an operating system; and
(b) a transmitter for communicating with the communications network,

a program adapted to be loaded onto the processing device and to run on the operating system of the processing device, said program being adapted to obtain user selected arbitrary media content, said program leaving a zero footprint on termination, and an input device to allow the user to carry out a user action that triggers transfer of said user selected arbitrary media content to said transmitter through said port.

22. The electronic meeting tool of claim 21 wherein the program is stored on the peripheral device.

23. The electronic meeting tool of claim 21 or 22 wherein the transmitter is a wireless transmitter or transceiver.

24. The electronic meeting tool of any of the claims 21 to 23wherein the peripheral device is a plug-and-play device.

25. The electronic meeting tool of any of the claims 21 to 24 wherein the program is adapted to screen scrape content of the second display.

26. The electronic meeting tool of any of the claims 21 to 25 wherein the input device is physical actuator coupled to the peripheral device.

27. The electronic meeting tool of claim 26 wherein the physical actuator has a surface area of between 100 and 14,400 square mm.

28. The electronic meeting tool of any of the claims 21 to 27 wherein the input device is a key displayed on the second display.

29. The electronic meeting tool of claim 28 wherein the key displayed on the second display is not screen scraped by the program.

30. A method for connecting a processing device to a communications network and for use with the system according to any of the claims 11 to 20, the processing device having a memory, a display and an operating system with at least one pre-installed generic driver providing a generic communications protocol for communication between processing device and a standard class of peripheral devices, the method comprising the steps of:
a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;
b) setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
c) coupling the processing device to a communications network via the peripheral device;
d) routing screen scraped data between the processing device and the communication network via the means for communication, wherein the generic communication protocol is used for transferring the screen scraped data between the processing device and the peripheral device.

31. The method of claim 30 wherein Step b) comprises presenting the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

32. The method of claim 30 wherein Step b) comprises presenting the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

33. The method of claim 30 wherein Step b) comprises presenting the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

34. The method of any of claims 30 to 33 wherein a client application is stored on the peripheral device which when run on the processing device obtains the screen scraped data.

35. The method of claim 34 wherein the client application is a portable application.

36. A peripheral device for use with the system according to any of the claims 11 to 20 and for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:
a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver;
a third software code portion for screen scraping data from the processing device; and
a fourth software code for routing screen scraped data between the processing device and the communications network over the means for communication; wherein the first software code portion is adapted to use the generic communication protocol for transferring the screen scraped data between the processing device and the peripheral device.

37. The peripheral device of claim 36, wherein the first software code portion is adapted to present the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

38. The peripheral device of claim 36, wherein the first software code portion is adapted to present the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

39. The peripheral device of claim 36, wherein the first software code portion is adapted to present the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

40. The peripheral device of any of the claims 36 to 39 wherein said executable software code comprises fifth code for providing a means for connecting to the communications network including a base node.

41. The peripheral device of any of the claims 36 to 40 wherein said executable software code comprises sixth code for providing means for capturing video frame buffers of the processing device.

42. The peripheral device of any of the claims 36 to 41 wherein said executable software code comprises seventh code for providing a means for encoding, compressing and optionally encrypting the screen scraped data and sending the screen scraped data the communication network.

43. The peripheral device of any of the claims 36 to 41 wherein said executable software code comprises eighth code for providing a means for handling the peripheral device.

44. The peripheral device of any of the claims 40 to 43 wherein said executable software code comprises ninth code for providing means for initiating connection to the base node.

45. The peripheral device of any of the claims 36 to 44 wherein said executable software code comprises tenth code for receiving inputs from an input device on the peripheral device.

46. The peripheral device of any of the claims 36 to 45 wherein said executable software code comprises eleventh code for providing a means for sending state changes to the visual indicator on the peripheral device.

47. The peripheral device of any of the claims 36 to 46 wherein said executable software code comprises Twelfth code for providing a means for presenting to the user a GUI.

48. The peripheral device of any of the claims 36 to 47 wherein said executable software code comprises thirteenth code for presenting a GUI for administration of the said executable software code when executed as a portable application.

49. The peripheral device of any of the claims 36 to 48 wherein said executable software code comprises fourteenth code for providing a means for displaying and activating a key on the display of the client processing device for allowing a user to input the start the transfer of data from the processing device to the base node.

50. A peripheral device use with the system according to any of the claims 11 to 20 and for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:
a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver; and
a third processing software code for routing data between the processing device and the communications network over the means for communication; wherein the first software code portion is adapted to use the generic communication protocol for transferring the data between the processing device and the peripheral device, and
an input device coupled to the peripheral device, the input device being adapted to react to a user action to trigger the transfer of the data from the processing device to the peripheral device.

51. The peripheral device of claim 50, wherein the first software code portion is adapted to present the peripheral device to the processing device as a human interface device and wherein the pre-installed generic driver is a human interface device driver.

52. The peripheral device of claim 50, wherein the first software code portion is adapted to present the peripheral device to the processing device as a mass storage device and wherein the pre-installed generic driver is a mass storage device driver.

53. The peripheral device of claim 50, wherein the first software code portion is adapted to

present the peripheral device to the processing device as a composite device and wherein pre-installed generic drivers drive different device interfaces independently.

54. The peripheral device of any of the claims 50 to 53 wherein the input device is physical actuator coupled to the peripheral device.

55. The peripheral device of claim 54 wherein the physical actuator has a surface area of between 100 and 14,400 square mm.

56. The peripheral device of any of the claims 50 to 55 wherein the input device is a key for display on the display.

57. The peripheral device of any of the claims 50 to 56 wherein said executable software code comprises fourth code for providing a means for connecting to the communications network including a base node.

58. The peripheral device of any of the claims 50 to 56 wherein said executable software code comprises fifth code for providing a means for capturing video frame buffers of the processing device.

59. The peripheral device of claim 58 wherein said executable software code comprises sixth code for providing a means for encoding, compressing and optionally encrypting the video frames and sending them over a secure link to the base node.

60. The peripheral device of any of the claims 50 to 59 wherein said executable software code comprises seventh code for providing a means for handling the peripheral device.

61. The peripheral device of claim 59 or 60 wherein said executable software code comprises eighth code for providing a means for initiating connection to the base node.

62. The peripheral device of any of the claims 50 to 61 wherein said executable software code comprises ninth code for receive inputs from an input device on the peripheral device.

63. The peripheral device of any of the claims 50 to 62 wherein said executable software code comprises tenth code for providing a means for sending state changes to the visual indicator on the peripheral device.

64. The peripheral device of any of the claims 50 to 63 wherein said executable software code comprises eleventh code for providing a means for presenting the user a GUI.

65. The peripheral device of any of the claims 50 to 64 wherein said executable software code comprises twelfth code for presenting GUI for administration of the executable software code when executed as a portable application.

66. The peripheral device of any of the claims 57 to 65 wherein said executable software code comprises thirteenth code for providing a means for displaying and activating a key on the display of the processing device for allowing a user input to start the transfer of data from the processing device to the base node.

67. A peripheral device use with the system according to any of the claims 11 to 20 and for providing communication connectivity to a processing device which is provided with memory, a display and an operating system with at least one pre-installed generic driver providing a generic communication protocol for communication between the processing device and a standard class of peripheral devices, the peripheral device comprising a memory in which executable software code is stored for execution on the processing device, said executable software code comprising:
a first software code portion for setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;
a second software code portion for connecting the processing device to a communications network via the peripheral device, the peripheral device having a transceiver;
a third software code portion for receiving media content from the network and for displaying the media content on the display in accordance with a set of rules; wherein the first software code portion is adapted to use the generic communication protocol for transferring the media content between the peripheral device and the processing device.

68. The peripheral device of claim 67 wherein said executable software code comprises

fourth code for providing a means for correctly configuring a receiver as an access point.

69. The peripheral device of claim 67 or 68 wherein said executable software code comprises fifth code for providing a means for listening for output of connection units trying to connect on a specific port.

70. The peripheral device of any of the claims 67 to 69 wherein said executable software code comprises sixth code for providing a means for a GUI for administration purposes.

71. The peripheral device of any of the claims 67 to 70 wherein said executable software code comprises seventh code for providing a means for publishing its presence over the network using the zeroconf protocol.

72. The peripheral device of any of the claims 67 or 71 wherein said executable software code comprises eighth code for providing a means for accepting and installing software updates.

73. The peripheral device of any of the claims 67 or 72 wherein said executable software code comprises ninth code for providing a means for providing facilities for pairing of connection units to the processing device.

74. The peripheral device of any of the claims 67 or 73 wherein said executable software code comprises tenth code for providing a means for auto-composing of different incoming arbitrary media streams and rendering of composited image on display.

75. The peripheral device of any of the claims 67 or 74 wherein said executable software code comprises eleventh code for providing a means for receiving, decrypting and decoding incoming arbitrary media content.

76. The peripheral device of any of the claims 67 or 75 wherein said executable software code comprises twelfth code for scaling of incoming arbitrary media streams.

77. The peripheral device of any of the claims 67 or 76 wherein said executable software code comprises thirteenth code for providing a means for displaying incoming arbitrary

media content in accordance with a set of rules.

78. A method for use with the system according to any of the claims 11 to 20 and for communicating arbitrary media content from users at a meeting comprising:
operating a display node of a communications network, the display node being coupled to a first display, to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display; and
connecting a peripheral device to a port of a processing device and communicating the user selected arbitrary media content via the communications network,
loading a program onto the processing device and running the program on the operating system of the processing device to obtain user selected arbitrary media content, said program leaving a zero footprint on termination, and
triggering transfer of said user selected arbitrary media content to said transmitter through said port after a user action on an input device.

79. A peripheral device for use with the system according to any of the claims 11 to 20, comprising:
a base
a connector for connection to a plug and play port of a host processing device,
a flexible connection between the base and the connector for transferring data signals and power,
an actuator on the base for actuating a signal and for transferring the signal to the connector for transfer to the port, wherein the base has electronics comprising permanent storage for storing a portable application, a processing engine, a transceiver and a visual indicator.

80. A method for use with the system according to any of the claims 11 to 20 and for providing communication connectivity from a processing device,
setting up a communications network between a base node of the communications network and a peripheral device coupled to the processing device;
transferring media content between the processing device and the peripheral device,
transmitting the media content from the peripheral device to the communications network,
receiving media content from the communications network at the base node and displaying the media content on a display in accordance with a set of rules.

81. Any of the above claims as software code stored on a non-transitory storage medium.

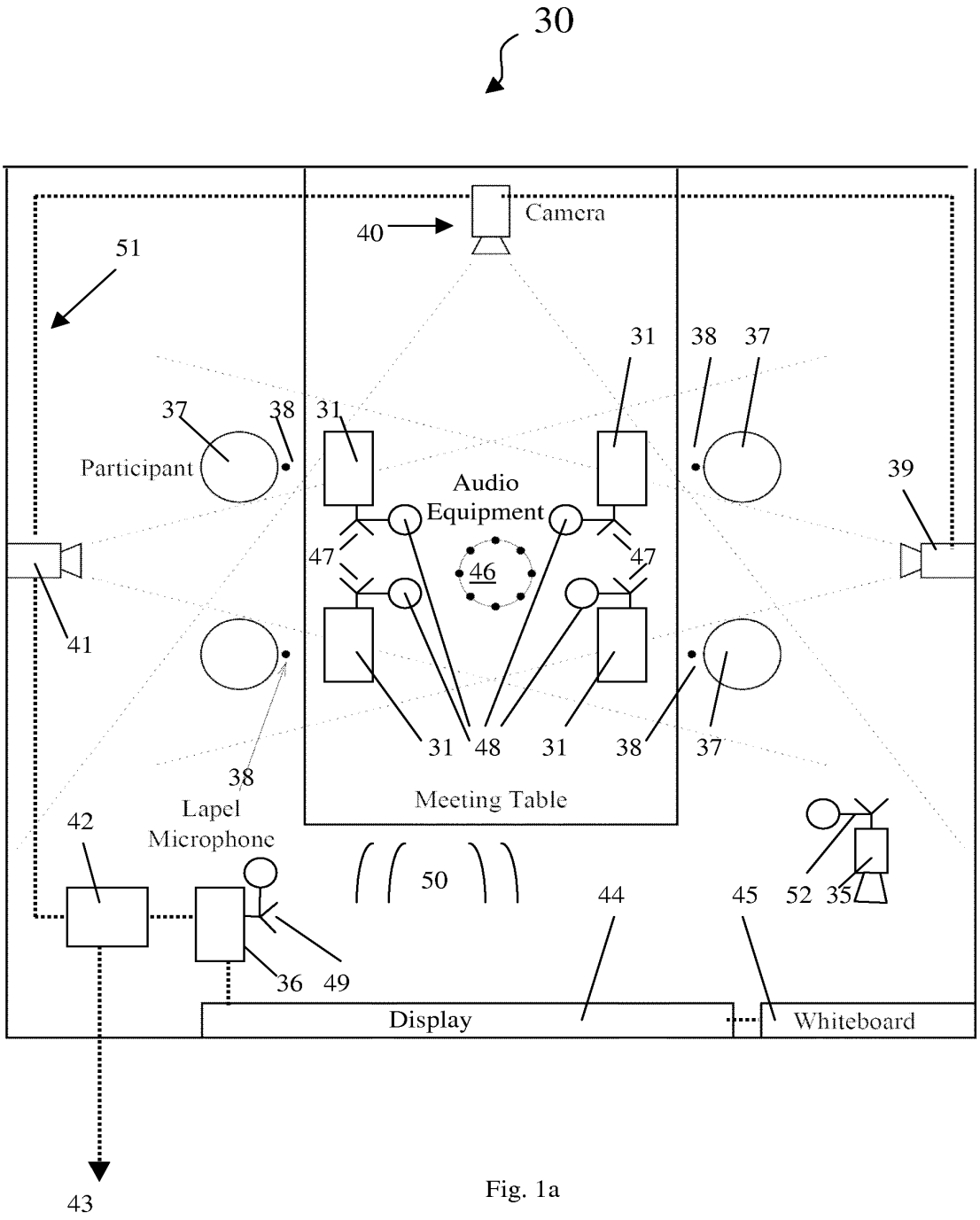

30
Camera
40
51
31
38
37
37
38
31
Participant
Audio
Equipment
39
47
46
47
41
31
48
31
38
37
38
Lapel
Microphone
Meeting Table
42
50
44
45
52
35
36
49
Display
Whiteboard
43

Fig. 1a

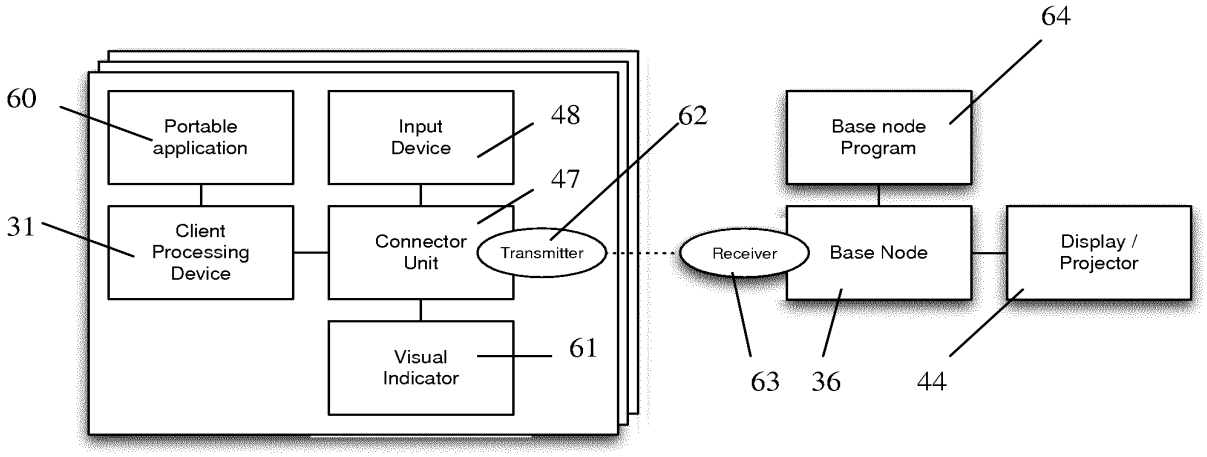

60
Portable application
Input Device
48
62
64
Base node Program
47
31
Client Processing Device
Connector Unit
Transmitter
Receiver
Base Node
Display / Projector
Visual Indicator
61
63
36
44

Fig. 1b

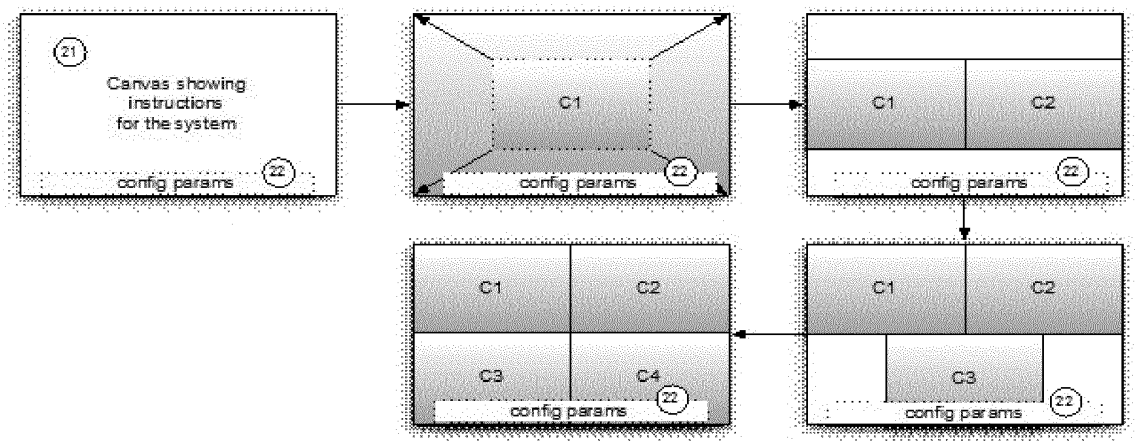

21
Canvas showing instructions for the system
config params
22
C1
C2
C3
C4

Fig. 2

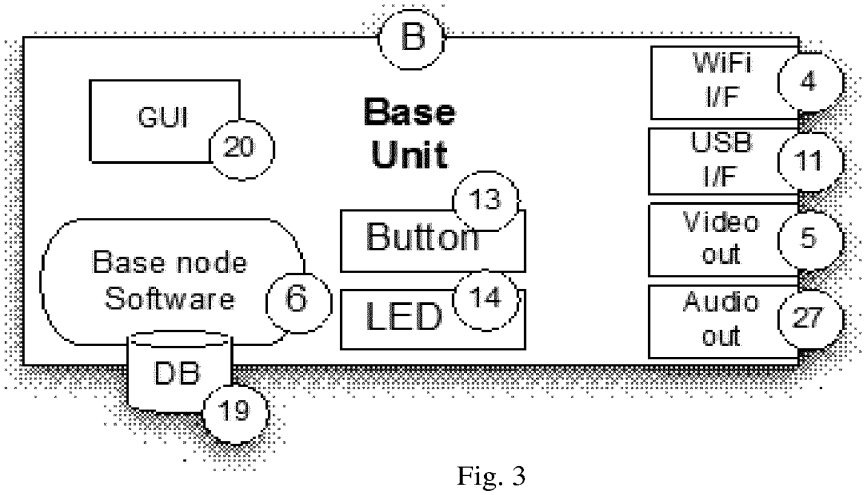


Fig. 3

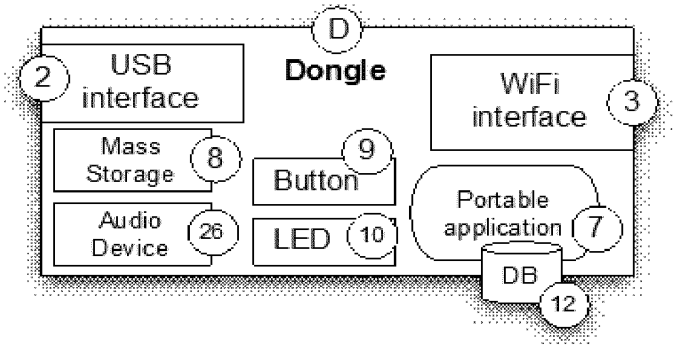


Fig. 4

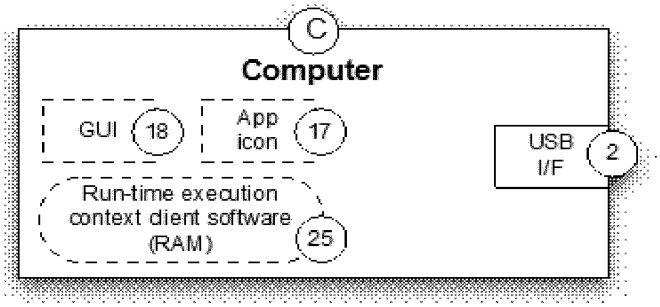


Fig. 5

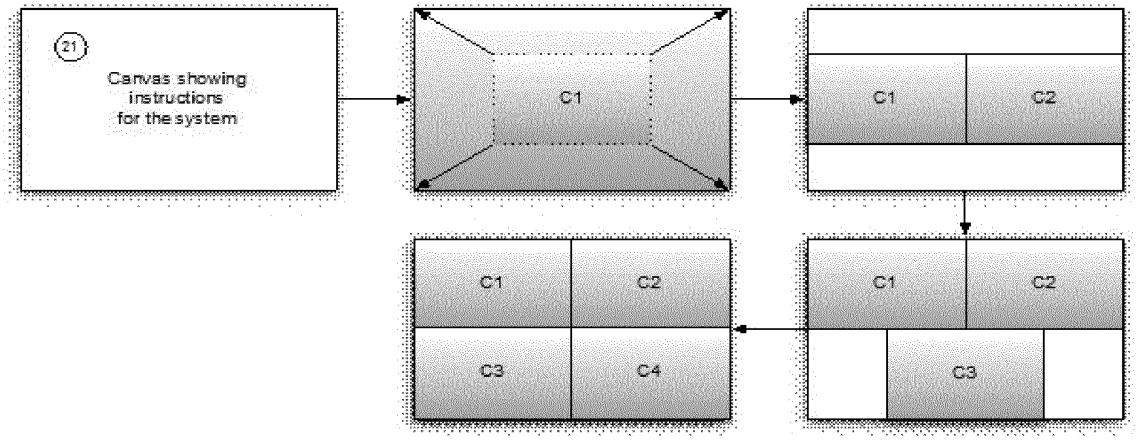


Fig. 6

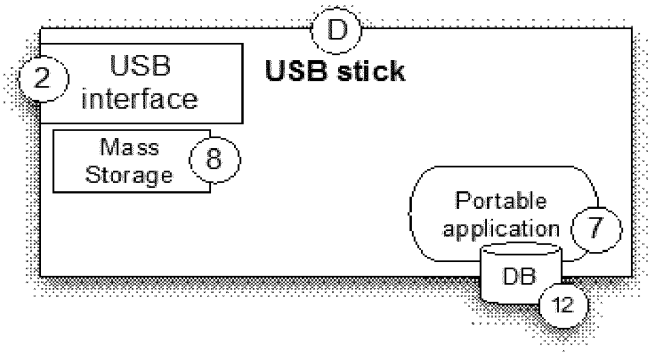


Fig.7

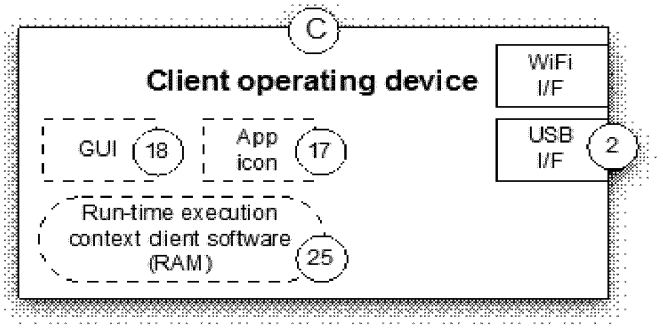


Fig. 8

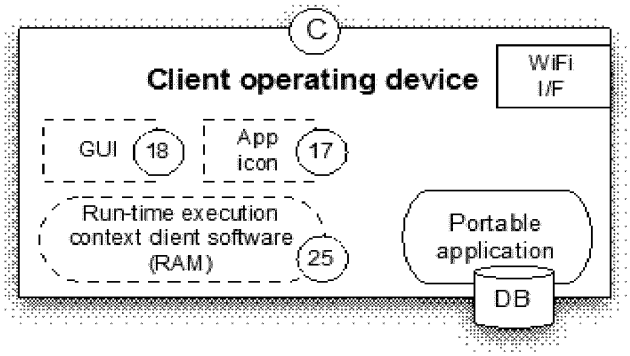

C
Client operating device
WiFi I/F
GUI
18
App icon
17
Run-time execution context client software (RAM)
25
Portable application
DB

Fig. 9

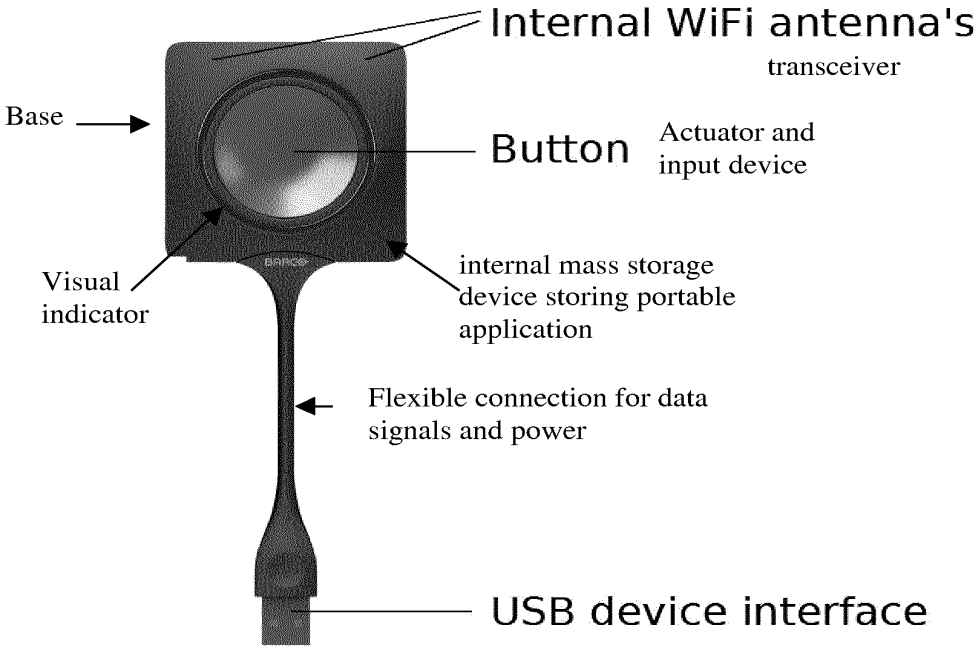

Internal WiFi antenna's
transceiver
Base
Button
Actuator and input device
Visual indicator
internal mass storage device storing portable application
Flexible connection for data signals and power
USB device interface

Fig. 10

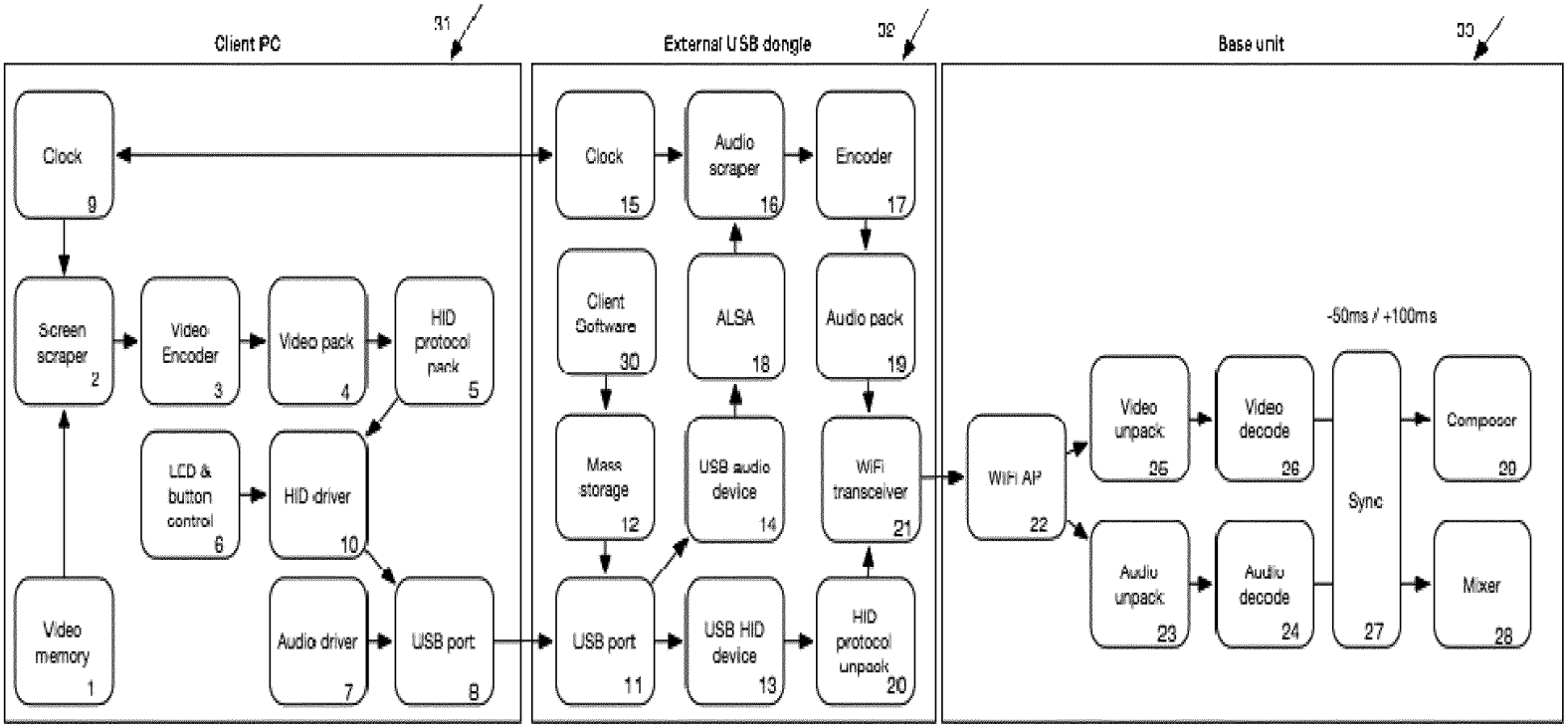

Client PC
31
External USB dongle
32
Base unit
33
Clock
9
Screen scraper
2
Video Encoder
3
Video pack
4
HID protocol pack
5
LCD & button control
6
HID driver
10
Video memory
1
Audio driver
7
USB port
8
Clock
15
Audio scraper
16
Encoder
17
Client Software
30
ALSA
18
Audio pack
19
Mass storage
12
USB audio device
14
WiFi transceiver
21
USB port
11
USB HID device
13
HID protocol unpack
20
WiFi AP
22
-50ms / +100ms
Video unpack
25
Video decode
26
Sync
Compositor
29
Audio unpack
23
Audio decode
24
Mixer
28

FIG. 11

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman BEEL
Filer:	Thomas J. Moore/Kaitlyn Miller
Attorney Docket Number:	BEEL3004/TJM/TL

Filed as Large Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
National Stage Fee	1631	1	280	280
Natl Stage Search Fee - Report provided	1642	1	480	480
National Stage Exam - all other cases	1633	1	720	720
Pages:				
Claims:				
Claims in excess of 20	1615	1	80	80
Miscellaneous-Filing:				
Oath/Decl > 30 Mos From 371 commencement	1617	1	140	140

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1700**

Electronic Acknowledgement Receipt	
EFS ID:	18464248
Application Number:	14344836
International Application Number:	PCT/EP2012/068167
Confirmation Number:	1046
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman BEEL
Customer Number:	23364
Filer:	Thomas J. Moore/Kaitlyn Miller
Filer Authorized By:	Thomas J. Moore
Attorney Docket Number:	BEEL3004/TJM/TL
Receipt Date:	13-MAR-2014
Filing Date:	
Time Stamp:	17:01:08
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

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Payment Type	Deposit Account
Payment was successfully received in RAM	$1700
RAM confirmation Number	4601
Deposit Account	020200
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	BEEL3004_Nat_Stage_Transmittal.pdf	216908 ce8f6aecfdc09595eba0824cda1d167db63bb823	no	4
Warnings:					
Information:					
2	Application Data Sheet	BEEL3004_ADS.pdf	1561554 159e4a41ce8e92178703e9d8ce12341c8486f24c	no	8
Warnings:					
Information:					
3		BEEL3004_Prelim.pdf	145692 0d5ce15f131d324ad50c81f03b0e9a1f20821cff	yes	9

Multipart Description/PDF files in .zip description

Document Description	Start	End
Preliminary Amendment	1	2
Abstract	3	4
Claims	5	8
Applicant Arguments/Remarks Made in an Amendment	9	9

Warnings:					
Information:					
4	Information Disclosure Statement (IDS) Form (SB08)	BEEL3004_IDS_SB08.pdf	613354 f562cd5af3e70b6338187bc23010fb9bb11aab9b	no	6
Warnings:					
Information:					
5	Foreign Reference	EP1187480A1.pdf	1886190 e0b9bb170c3311a857655b285aa88b9042fa86c2	no	30
Warnings:					
Information:					
6	Foreign Reference	EP1246395A1.pdf	669187 ae59839de0141240ffa95efd197945c15eaabd72	no	12
Warnings:					
Information:					

7	Foreign Reference	WO0052887A1.pdf	3054783 5425f205a15b56efe4cf422768b98eb8406c0289	no	61
Warnings:					
Information:					
8	Non Patent Literature	DE102011055443_Search_Rep.pdf	377385 73b573b0eb4ccbad651299a974efdfa4b1c34446	no	8
Warnings:					
Information:					
9	Non Patent Literature	Freespeech_NPL.pdf	2517882 63bb73a6ef758d63fd59e9ef6044e594daff1d41	no	12
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11	Non Patent Literature	Search_Rep_PCTEP2012068166.pdf	241682 1ac0b192c7cb5414c93c593cb188771bda0312f5	no	3
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Information:					
12	Non Patent Literature	Search_Rep_PCTEP2012068167.pdf	233559 e34cf2cab4bda484684aaa1af08ef8913f79b2c6	no	3
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Information:					
13	Non Patent Literature	Search_Rep_PCTEP2012068168.pdf	233672 c3a768c6735cbe83deb7cdc1655f70181d466a2d	no	3
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Information:					
14	Non Patent Literature	Search_Rep_PCTEP2012068169.pdf	244388 beed1abe2774df829e03bacd4e7a865b2826a969	no	4
Warnings:					
Information:					
15		BEEL3004_pct_publication.pdf	3853839 522aa8840d031b32dff6daafb7c2eb5f75d3b559	yes	74

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Abstract	1	2
	Specification	3	55
	Claims	56	68
	Documents submitted with 371 Applications	69	74

Warnings:					
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16	Fee Worksheet (SB06)	fee-info.pdf	38089 67cd14c719962671b800c2cc686546e1fd0c266e	no	2
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APPLICATION NUMBER: *61/635,234*
FILING DATE: *April 18, 2012*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US61/635,234*

By Authority of the
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Certifying Officer

Electronic Acknowledgement Receipt

EFS ID:	12575816
Application Number:	61635234
International Application Number:	
Confirmation Number:	2468
Title of Invention:	ELECTRONIC TOOL AND METHODS FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Customer Number:	21559
Filer:	James D. DeCamp/Megan Kiley
Filer Authorized By:	James D. DeCamp
Attorney Docket Number:	50304/B6680
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Specification	50304_B6680_Specification.pdf	292438 4a95044d0fe94fbcd619f9b0f98c10420aa459e1	no	60
Warnings:					
Information:					
2	Drawings-only black and white line drawings	50304_B6680_Drawings.pdf	1007004 adfce1c448b9877e05e5192a2d4bdc916f1462a4	no	5
Warnings:					
Information:					
3	Transmittal of New Application	50304_B6680_Transmittal.pdf	34140 0b84f5e2572fc63e3a1f26e57df0ee0d9e7f9771	no	1
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	29915 b883e2dd3a0b1a346e3d2a4f7e34a836f1c1293a	no	2
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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 C.F.R. § 1.53(c).

Docket Number	50304/B6680	Type a plus sign (+) inside this box --->	+

INVENTOR(S)/APPLICANT(S)

LAST NAME	FIRST NAME	MIDDLE NAME	RESIDENCE (CITY AND EITHER STATE OR FOREIGN COUNTRY)
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COEN	Guy		Aalst, Belgium

TITLE OF THE INVENTION (280 characters max)

ELECTRONIC TOOL AND METHODS FOR MEETINGS

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ENCLOSED APPLICATION PARTS (check all that apply)

☒ Specification	Number of pages: 60	□ Application Data Sheet	Number of pages: 0
☒ Drawings	Number of sheets: 5	□ Other (specify):	
□ Cover Sheet	Number of pages: 0		

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

□ A check or money order is enclosed to cover the filing fees.	Filing Fee:	$250.00
☒ E-file Application Size Fee: 65 Pages x .75 = 0 - 100 = _____ / 50 = _____ x [$270/$135] = 0	Application Size Fee:	$ 0
☒ The Commissioner is hereby authorized to charge filing fees not covered and apply any credits to Deposit Account Number: 03-2095.	Total:	$250.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

□ Yes, the name of the U.S. Government agency and the Government contract number are:

□ Applicant claims small entity status under 37 C.F.R. § 1.27.

Respectfully submitted,

SIGNATURE: */James D. DeCamp/* DATE: April 18, 2012

TYPED OR PRINTED NAME: James D. DeCamp

REGISTRATION NO.: 43,580

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ELECTRONIC TOOL AND METHODS FOR MEETINGS

The present invention relates to electronic tools for meetings including methods or devices for providing connection to a communications network, to networks or methods of operating the network, methods or devices for use in displaying media content as well as software for performing any of these methods.

Technical background

Tools for collaboration

Allowing *ad hoc* groups of persons to communicate with each other is one of the fundamental aspects of collaboration, problem solving, negotiation, teaching and education, etc. To assist in communication, there has been an explosion of electronic communication tools such as electronic conferencing tools, e.g. synchronous and asynchronous conferencing, online chat, Instant Messaging, audio conferencing, videoconferencing, data conferencing, application sharing, remote desktop sharing, electronic meeting systems, collaborative management (coordination) tools, project management systems, knowledge management systems, and social software systems.

One classic approach is the lecture or seminar often involving a presentation using presentation software. To a large extent the traditional single person presentation or lecture has been maintained with the audience being in a rather passive mode as far as determining, constructing, augmenting or modifying the information to be presented is concerned.

As with other business processes, meetings are going digital. Increasingly, people are using computer technology alone and in conjunction with broadband networks to support their meeting objectives prior to and during an actual meeting. For example, e-mail is used to pass around files for people to read prior to a meeting.

Collaborative workspaces in corporate networks and on the Internet offer geographically distributed collaborators a virtual repository for documents related to a project or a meeting. Electronic meeting support systems, such as interactive network-

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connect white boards and videoconferencing appliances, are available for the benefit of those who share the same room as well as those who are in remote locations.

The AMIDA Final Public Report describes the overall methodology behind the development of meeting support technologies. It reports that numerous studies confirm that meetings dominate the way people work. Namely, according to a study conducted by MCI Worldcom in 2003 a business person participates in 60 meetings per month. People meet in groups for a multitude of reasons. They interact in numerous predictable and unpredictable ways and the results of their interactions are as varied as the people who participate and the projects on which they are collaborating or communicating. Studies of business processes also reveal that approximately 80% of the "workload" associated with a project or process happens in preparation for a meeting. In other words, many people view the "live" meeting as a milestone or deadline by which they can pace and measure their productivity and that of their colleagues. Unfortunately, for many information managers, being in perpetual meetings has reduced their ability to prepare adequately for the next meeting, perpetuating a vicious and negative cycle.

However, Marc Al-Hames et al. report in "Audio-Visual Processing in Meetings: Seven Questions and Current AMI Answers", that although large parts of working days are consumed by meetings and conferences, unfortunately a lot of them are neither efficient, nor especially successful. They report a study in which people were asked to select emotion terms that they thought would be frequently experienced in a meeting. The top answer – mentioned from more than two third of the participants – was "boring"; furthermore nearly one third mentioned "annoyed" as a frequently perceived emotion.

The conclusion is that despite the plethora of electronic aids to meetings, fundamental problems in handling meetings have not been solved. In fact organising and conducting meetings in a business context involves a large number of factors.

Participation

A lack of efficiency of meetings is addressed in the article "Mood indicators on

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electronic meeting tools" IBM, IP.com number: IPCOM000011711D, Publication Date: March 12, 2003. This article addresses the issue that the lack of direct feedback makes meetings clumsy, inefficient and often unproductive. It proposes a "mood indicator" as well as an "I want to ask a question" indicator which allow the presenter to choose an appropriate moment to pause, change track or field a question. It is argued that interrupting a presenter in full flow can be awkward; however, sometimes it is difficult to get an opportunity to ask a question or make a comment when many different people are trying to make their voices heard. In a similar vein, US6966035 suggests displaying a "murmur frame" for a participant to express a view. To increase user participation, US 2010/0087139 discloses a system for sending a selection to another computer, and US 2006/0095376 discloses a system for secure voting. Commenting, voting or selecting requires that a central authority provides the information that is to be selected or commented or voted on. Hence, these proposals still leave a central figure such as the presenter in a dominating position and the other members of the meeting are largely an audience with limited selection or voting or participation rights.

A further problem with meetings is that someone is usually late or has to leave early. With the person arriving late one has to decide if the meeting is interrupted and a summary of the proceedings so far is given. For the person leaving early (often a senior person), subsequent discussions can go missing. If there is a notes taker, this provides a personal summary of the meeting – but not an objective one.

Presents systems do not provide an optimal solution.

Legal and security issues

A legal requirement of a meeting is that presentations, comments and submissions need to be completely reproducible – in some circumstances, e.g. in a share holders' meeting, the events in the meeting should be subject to total recall. Computer-supported collaborative work technologies, particularly those which capture human verbal and non-verbal communications (audio and video interaction) in addition to text and graphics generated during a meeting, promise to have a long term impact on how people will prepare for and behave during and following meetings. In addition,

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connecting to a network brings the danger of virus, malware or spyware transfer in either direction, and there is danger of copying of confidential information.

Practical Difficulties

Scalability and ease of use

There are even more fundamental problems with using electronic tools in meetings. If two persons want to make two presentations then usually either both presentations must be placed on one machine or there is a need to swap between the presenters' machines. To bring the display content of a computer to a projector, the most common ways are to use a cable that connects the display adapter of the graphics card to the video input of the projector [method 1] or to use a software that captures the display contents and sends it over a wired or wireless network to a remote base unit connected to the projector [method 2]. This is often called "remote desktop" and is mostly used for remote administration or remote IT assistance purposes.

Less common but also practiced methods are to use a special device connected to the display adapter of the graphics card, that captures, encodes and streams the display content over a wired or wireless network [method 3].

Method 1 has several practical problems and disadvantages. In meetings where people want to contribute content from their own computers, e.g. to project images on a display, typically a video cable such as a VGA cable is used to connect each PC one at a time to the projector. This is not only not scalable but also can be and often is quite a cumbersome process that typically wastes valuable meeting time and takes the dynamism out of the meeting. Connection can be made more difficult and time consuming for example if the computer has to be rebooted for it to detect the projector or when the format of the PC differs from the format of the projector. In addition changing format can leave the computer with a new format that is not compatible with its own screen so that on reboot of the PC alone, nothing is displayed on the computer screen. Without a visible screen image the necessary re-configuration can be difficult. These issues are aggravated by a number of elements:

- The use of many different video adapters, such as VGA, DVI, DP, HDMI,...

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- Reach depends on cable length: too long leaves a tangled cable "salad" in the meeting room, too short reduces flexibility, often necessitating people to move around in the meeting room when they want to present something.
- Cable connection is either point to point or requires tedious and extensive cabling and the use of complex and expensive video switches.
- It is often difficult and time consuming to find the right display resolution and refresh rate that both the computer and the display or projector support.

Method 2 also has many drawbacks. If the connection is made to a corporate LAN there is a danger of virus, malware or spyware transfer in either direction, there is danger of copying of confidential information, and there is the difficulty of making the connection, e.g. entry of a user code and password, as well the administration of such passwords and user codes.

The advantage of method 3 is that the computer does not need to use its own processing power to bring the display content in a form that is easily transported over a network. This advantage becomes less relevant as computers grow in processing power. A drawback of method 3 is that the same problems often encountered with method 1 of connecting to the display adapter remain. Another drawback is that the special device referred to requires significant processing power, which means that this device will consume much power, be relatively big and certainly be relatively expensive.

An alternative method in the making today is to use the well known USB interface of the computer for extracting the display content of the computer. US 2009/0198839 discloses such a pluggable cable arrangement. US 2011/0115689 discloses a similar USB solution for wireless connection to a projector. Accordingly connecting a projector to a computer using the standard USB port might become commonplace with time. However, this usually requires special drivers and even special hardware. Connecting a projector to a computer using the standard USB port hence might become commonplace – but even when that happens there will be a mix of new and legacy machines for several years.

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Firewalls

Additional problems can occur with firewalls. Typically a visitor to a meeting will bring a computer such as a laptop that is set up for a different corporate networking environment and hence has different or incompatible networking settings. The setting up of a firewall can be complicated and if this is not done correctly, telecommunication software that has to pass through a firewall may be blocked. In order to solve problems associated with firewalls it may be necessary to open ports or identify or even add programs in an exception list. If, besides a network (hardware) firewall and an operating system firewall, there is any software based third-party firewall like Zonealarm, Norton Systemworks, CA Internet Security Suite or McAfee Firewall, then it is necessary to follow that software developer's documentation to place programs on a safe list or adding exceptions to the firewall rules. Such activity is beyond the usual user. Fussing with computer settings, or having to call for IT support wastes valuable meeting time and takes the dynamism out of the meeting.

Conclusion

The following problems remain for holding a face-to-face meeting using advanced electronic tools at the present time:

- Complexity of the networking infrastructure.
- High demands on technical expertise of users in current systems that are supposed to be designed to support everyday use by the non-expert user.
- Barriers to the use of complicated technology in meetings.
- Great variety of possible collaborative software solutions – none of which seems to solve the fundamental problems of holding successful meetings.
- Meetings being boring or annoying for members of the meeting.
- Complexity of firewalls and other security measures employed in corporate networks.
- Lack of, or restriction of participation by members of a meeting.
- Time taken to prepare presentations for meetings.
- Need to record events in the proper time sequence at meetings without burdening a meeting more than necessary.

Although some tools solve some of these problems effectively, no electronic meeting tool solves all of them.

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Summary of the invention

An object of the present invention is to provide network solutions including electronic tools for meetings including devices for providing connection to a communications network, to methods of operating the network, methods of displaying media content as well as software for performing any of these methods or for implementing such systems.

The present invention provides in embodiments a method and a system for connecting a processing device such as a laptop, smartphone, PDA, computer, tablet and suchlike to a communications network, the processing device having a memory, a display and an operating system with pre-installed generic drivers providing a generic communications protocol for communication between processing device and a standard class of peripheral devices. The method and/or system are adapted for:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) setting up, by means of the pre-installed generic driver of the operating system, a means for communication between the peripheral device and the processing device;

c) coupling the processing device to a communications network via the peripheral device;

d) routing audio data between the processing device and the communication network via the means for communication, wherein the generic communication protocol is used for transferring the audio data between the processing device and the peripheral device.

In particular the method and/or system can be adapted for:

a) coupling a peripheral device to the processing device, the peripheral device having a transceiver;

b) setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio communication between the peripheral device and the processing device and by means of a second pre-installed generic driver of the operating system, a means for data communication between the peripheral device and

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the processing device;

c) coupling the processing device to a communications network via the peripheral device;

d) routing audio data between the processing device and the communication network via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data between the processing device and the peripheral device.

In an aspect the present invention provides an electronic meeting tool for communicating arbitrary media content from users at a meeting comprising:

a node configuration means adapted to operate a display node of a communications network, the display node being coupled to a first display, the node configuration means being adapted to receive user selected arbitrary media content and to control display of the user selected arbitrary media content on the first display; and

at least one peripheral device adapted to communicate the user selected arbitrary media content via the communications network, wherein the peripheral device is a connection unit comprising:

. (a) a connector adapted to couple to a port of a processing device having a second display, a memory and an operating system; and

(b) a transmitter for communicating with the communications network,

a program adapted to be loaded onto the processing device and to run on the operating system of the processing device, said program being adapted to obtain user selected arbitrary media content, said program leaving a zero footprint on termination, and

an input device to allow the user to carry out a user action that triggers transfer of said user selected arbitrary media content to said transmitter through said port.

The program can be stored on the peripheral device. The transmitter can be a wireless transmitter or transceiver. The peripheral device can be a plug-and-play device. The program cane adapted to screen scrape content of the second display.

The input device can be physical actuator coupled to the peripheral device. The

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