【0103】
次に、制御部２０３は、挿入されているＵＳＢデバイスの識別情報が無線デバイス１が保有する識別情報であるか否かを判定する（ステップＳ１０４）。ここで、識別情報であるＭＡＣアドレスは、上位２４ビットがベンダーＩＤとなっており、下位２４ビットがベンダー毎に割り当てるシリアル番号となっている。制御部２０３は、ＵＳＢデバイスのＭＡＣアドレスが所定のベンダーＩＤであり、かつ所定のシリアル番号となっているか否かを判定することにより、ＵＳＢデバイスのＭＡＣアドレスが無線デバイス１のＭＡＣアドレスであるか否かを判定する。
【0104】
この処理において、挿入されたＵＳＢデバイスが無線デバイス１であると判定すると（ステップＳ１０４：ＹＥＳ）、制御部２０３は、無線部２０６の機能を停止して、無線部２０６での無線信号の送受信を停止する（ステップＳ１０５）。
【0105】
その後、制御部２０３は、時計回路２０５から現時刻の情報を取得し（ステップＳ１０６）、さらに接続可能時間を不揮発性メモリ２０４から読み出す（ステップＳ１０７）。このとき、制御部２０３は、接続可能時間と現時刻とに基づいて、有効時間を算出する。例えば、接続可能時間が２時間であり、現時刻がＰＭ２：３０であるとすると、有効時間をＰＭ４：３０とする。また、年月日も有効時間に含める。
【0106】
次いで、制御部２０３は、無線部２０６等で用いる暗号キーを生成して（ステップＳ１０８）、ステップＳ１０９に処理を移行する。このように、制御部２０３は、無線設定情報を無線デバイス１のフラッシュメモリ１０４に書き込む前に、無線設定情報のうち少なくとも暗号キーを生成する設定情報生成部として機能する。なお、暗号キーの生成は、無線デバイス１に無線設定情報を書き込む直前に行うようにしているが、画像投影装置の電源がＯＮとなる毎に暗号キーの生成を行うようにすることもできる。また、設定書込ボタン２３０が操作される毎に暗号キーの生成を行うようにしてもよい。
【0107】
ステップＳ１０９において、制御部２０３は、無線設定情報を不揮発性メモリ２０４から読み出す。ここで読み出す無線設定情報は、図９に示したように、ネットワークモード、ネットワーク名（暗号キーと有効時間を除く）などがある。なお、このように読み出した情報とステップＳ１０８で生成した暗号キー及びステップＳ１０７で生成した有効時間が無線デバイス１に書き込むための無線設定情報となる。但し、ＩＰアドレスに関しては、画像投影装置２とは異なるＩＰアドレスが設定される。
【0108】
次に、制御部２０３は、無線デバイス１への無線設定情報の書き込み処理を開始するために、無線デバイス１へ書き込み要求を行う。この要求が無線デバイス１で受信されると、無線デバイス１のＣＰＵ１０１は、書き込み中ランプ１５０を点灯させる（ステップＳ１１０）。
【0109】
その後、制御部２０３は、無線設定情報を無線デバイス１のフラッシュメモリ１０４に書き込む。また、書き込み中ランプ１５０を点滅させる（ステップＳ１１０）。
（ステップＳ１１１）。制御部２０３は、書き込みが終了するまで待ち（ステップＳ１１２）、この書き込みが終了すると（ステップＳ１１２：ＹＥＳ）、処理をステップＳ１１３に移行する。
【0110】
ステップＳ１１３において、制御部２０３は、無線デバイス１がＵＳＢインターフェイス２０１から無線デバイス１が抜かれたか否かを判定する（ステップＳ１１４）。この処理において、無線デバイス１が抜かれたと判定すると（ステップＳ１１４：ＹＥＳ）、制御部２０３は、無線部２０６の機能を再開して、無線部２０６での無線信号の送受信を可能とし（ステップＳ１１５）、処理をステップＳ１１５に移行する。

【0111】
ステップＳ１０２において、ＵＳＢインターフェイス２０１にＵＳＢデバイスが挿入されていないと判定すると（ステップＳ１０２：ＮＯ）、処理をステップＳ１１６に移行する。
【0112】
また、ステップＳ１０４において、挿入されたＵＳＢデバイスが無線デバイス１ではないと判定すると（ステップＳ１０４：ＮＯ）、制御部２０３は、処理をステップＳ１１６に移行する。なお、ＵＳＢデバイスが無線部を有するデバイスであっても、その識別情報が特定の識別情報でないと判定すると、無線デバイス１ではないと判定して、無線設定情報の書き込みを行わないようにしている。
【0113】
ステップＳ１１６において、制御部２０３は、電源がオフであるか否かを判断する。制御部２０３は、電源がオフであると判定した場合には（ステップＳ１１６：ＹＥＳ）、本処理を終了する一方、電源がオフではないと判定した場合には（ステップＳ１１６：ＮＯ）、ステップＳ１００から繰り返し処理を実行することとなる。
【0114】
以上のように、本実施形態における画像投影装置２の制御部２０３は、無線デバイス１がＵＳＢコネクタ１０４に接続されると、画像投影装置２と無線通信を行うための無線設定情報をこの無線デバイス１に書き込むようにしている。また、無線デバイス１がＵＳＢコネクタ１０４に接続されてから所定期間は、無線部２０６の動作を停止するようにしている。
【0115】
ところで、上述の実施形態においては、暗号キーと有効時間とを別々の情報として無線デバイス１に書き込むこととしたが、暗号キーに有効時間を埋め込むようにしてもよい。
【0116】
この場合、図１０に示すように、制御部２０３は、まずランダム変数を生成する（ステップＳ１２０）。その後、制御部２０３は、不揮発性メモリ２０４に記憶している無線設定情報のうち接続可能時間の情報を取得し、このように取得した接続可能時間と時計回路２０５から得られた現時刻の情報と基づいて有効時間を演算する（ステップＳ１２１）。
【0117】
次いで、制御部２０３は、不揮発性メモリ２０４に記憶している無線設定情報の暗号キーのモードが６４ｂｉｔなのか１２８ｂｉｔなのかを判定する（ステップＳ１２２）。この処理において、暗号キーのモードが１２８ｂｉｔであると判定する（ステップＳ１２２：ＹＥＳ）と、制御部２０３は、暗号キーの制限を１３文字或いは２６桁の１６進数とする（ステップＳ１２３）。一方、暗号キーのモードが６４ｂｉｔであると判定すると、制御部２０３は、暗号キーの制限を５文字或いは１０桁の１６進数とする（ステップＳ１２４）。
【0118】
その後、ステップＳ１２０で生成したランダム変数（ランダム値）とステップＳ１２１で演算した有効時間とに基づいて、制御部２０３は、暗号キーを生成する。この暗号キーは、ステップＳ１２３の処理或いはステップＳ１２４の処理によって制限された条件で生成されることになる。例えば、１２８ｂｉｔの場合、１３文字のうち、前半７文字をランダム変数で構成し、後半６文字を日時で構成する。このように、構成することにより、コンピュータ装置３の画像転送アプリケーションは、暗号キーにより有効時間を設定することができる。また、コンピュータ装置３のＣＰＵ３０５は、画像転送アプリケーションの実行により、暗号キーに基づいて、有効時間を検出することができる。
【0119】
ところで、画像投影装置２によって生成する暗号キーを継続して同一の暗号キーとしてしまうと、仮に暗号キーが知られた場合に、その後にコンピュータ装置と画像投影装置との間の無線通信を傍受されてしまう恐れがある。上述においては、無線デバイス１に無線

設定情報を書き込む毎に暗号キーを更新することによって、無線通信の秘匿性を向上させている。

【0120】

ところが、複数のコンピュータ装置３の表示画像を切り替えて、画像投影装置２から表示画像を投影する場合、複数のコンピュータ装置３にそれぞれ接続するための、複数の無線デバイス１が必要となる。しかし、無線デバイス１毎に暗号キーを変更してしまうと、最新に画像投影装置２に接続した無線デバイス１のみしか画像投影装置と通信ができなくなってしまうという問題がある。また、無線デバイス１が接続される毎に暗号キーを変更しなければならず処理に負荷が生じる。

【0121】

そこで、本実施形態の画像投影装置２においては、所定の条件を満たすときに、暗号キーを更新するようにしている。このように暗号キーを更新する手法の一例を、図面を参照して説明する。図１１は、暗号キー自動更新処理のフローチャートである。

【0122】

図１１に示すように、暗号キー自動更新処理が開始されると、制御部２０３は、まず、経過時間を初期化する（ステップＳ１３０）。

【0123】

その後、制御部２０３は、無線デバイス１がＵＳＢインターフェイス２０１から抜かれたか否かを検出する（ステップＳ１３１）。この処理において、無線デバイス１がＵＳＢインターフェイス２０１から抜かれたと判定すると（ステップＳ１３１：ＹＥＳ）、制御部２０３は、経過時間のカウントアップを開始（ステップＳ１３２）して、処理をステップＳ１３３に移行する。

【0124】

ステップＳ１３３において、カウントアップしている経過時間を取得した後、制御部２０３は、画像投影装置２の無線部２０６が無線通信を行っている状態（無線接続中）であるか否かを判定する（ステップＳ１３４）。

【0125】

この処理において、無線部２０６が無線通信を行っていない状態であると判定すると（ステップＳ１３４：ＮＯ）、制御部２０３は、経過時間が接続許容時間を越えたか否かを判定する（ステップＳ１３５）。一方、無線部２０６が無線通信を行っている状態であると判定すると（ステップＳ１３４：ＹＥＳ）、制御部２０３は、経過時間をリセット（ステップＳ１３７）して、処理をステップＳ１３１に移行する。

【0126】

ステップＳ１３５において、経過時間が接続許容時間を越えたと判定すると（ステップＳ１３５：ＹＥＳ）、制御部２０３は、暗号キーの更新を行って暗号キー自動更新処理を終了する。一方、経過時間が接続許容時間を越えていないと判定すると（ステップＳ１３５：ＮＯ）、制御部２０３は、処理をステップＳ１３１に移行する。

【0127】

このように本実施形態の画像投影装置２の制御部２０３は、無線部２０６を介してコンピュータ装置３との通信が行われない期間が所定期間以上（例えば、２時間以上）となったとき、無線設定情報のうち少なくとも暗号キーを生成して更新するようにしており、これにより暗号キー生成処理の負荷を低減することができる。また、複数の無線デバイス１に無線設定を行うことができる。なお、ＩＰアドレスに関しては、制御部２０３は、無線デバイス１毎に異なるＩＰアドレスを割り当てるようにする必要がある。

【0128】

また、暗号キーの更新を自動的に行うことに加え又は代えて、手動操作によって行うようにしてもよい。すなわち、画像投影装置２には、無線設定情報のうち少なくとも暗号キーを生成して更新する動作を指示する更新ボタン２３１を備えており、更新ボタン２３１が操作される毎に、無線設定情報のうち少なくとも暗号キーを生成して更新するようにしてもよい。画像投影装置２の電源をＯＮのままにして、利用者や利用グループが交代する

場合には、暗号キーを更新することにより高いセキュリティを確保できる。

【0129】

（コンピュータ装置３について）

次に、コンピュータ装置３について、図面を参照して説明する。図１２は本実施形態におけるコンピュータ装置３のブロック図である。

【0130】

図１２に示すように、コンピュータ装置３は、ＵＳＢコネクタ３０１と、ＵＳＢバスコントローラ３０２と、表示部であるＬＣＤ３０３と、ＬＤＣ３０３に表示させるための処理を行うグラフィックスコントローラ３０４と、コンピュータ装置３全体の制御を行うＣＰＵ３０５と、プログラムや各種パラメータを格納するメモリ３０６と、これらを接続する第１のバス３０７を備えている。

【0131】

さらに、コンピュータ装置３は、１０ＢＡＳＥ-Ｔや１００ＢＡＳＥ-ＴＸに対応したＬＡＮインターフェイス３１０と、マウス３１１と、キーボード３１２と、ＣＤ／ＤＶＤドライブ３１３と、フロッピー（登録商標）ディスクドライブ３１４と、ハードディスク３１５と、これらを接続する第２のバス３１６を備えている。そして、第１のバス３０７と第２のバス３１６とのデータのやり取りを制御するバスコントローラ３０８とを備えている。

【0132】

ＵＳＢコネクタ３０１とＵＳＢバスコントローラ３０２によって、無線デバイス１や外付けキーボードなどのＵＳＢデバイスとＵＳＢ規格に基づいたデータの送受信を処理を行うものである。

【0133】

また、メモリ３０６には、オペレーティングシステム（ＯＳ）プログラムやプレゼンテーション用アプリケーションプログラムが格納されており、コンピュータ装置３の電源がオンになると、まずＣＰＵ３０５はメモリ３０６からＯＳプログラムを読み出して実行することにより、マウス３１１やキーボード３１２の入出力に関する機能や、メモリ３０６やハードディスク３１５などのメモリ管理など、コンピュータ装置の基本的な機能を実行可能にするものである。

【0134】

そして、このＯＳプログラムがＣＰＵ３０５によって実行された状態で、プレゼンテーション用アプリケーションプログラムなどのコンピュータプログラムがメモリ３０６から読み出されて実行される。なお、後述のように、デバイスドライバや画像転送用アプリケーションプログラムがインストールされた場合には、これらもＣＰＵ３０５によって実行されることにより、各種の制御を行うことになる。

【0135】

以上のように構成されたコンピュータ装置３における無線情報設定の基本的な動作の一例について説明する。図１３は、コンピュータ装置３における無線情報設定の動作を示すフローチャートであり、コンピュータ装置３の制御部であるＣＰＵ３０５によって制御されるものである。

【0136】

図１３に示すように、コンピュータ装置３のＣＰＵ３０５は、無線デバイス１が接続されているか否かを判定する（ステップＳ２００）。無線デバイス１が接続されているか否かの判定は、ＵＳＢコネクタ３０１にＵＳＢデバイスが接続されたか否かを判定し、さらにＵＳＢデバイスが接続されたときに、このＵＳＢデバイスが特定の識別情報を有しているかによって判定する。

【0137】

この処理において、無線デバイス１が挿入されたと判定すると（ステップＳ２００：ＹＥＳ）、ＣＰＵ３０５は、オートラン動作の処理を開始する（ステップＳ２０１）。このオートラン動作処理は、図１４におけるＳ２２０～Ｓ２２７の処理であり、後述する。

【0138】
オートラン動作処理が終了すると、ＣＰＵ３０５は、画像転送アプリケーションが正常に起動しているか否かを判定する（ステップＳ２０２）。この処理において、画像転送アプリケーションが正常に起動していると判定する（ステップＳ２０２：ＹＥＳ）と、処理をステップＳ２０３に移行する。以下、ステップＳ２０３からＳ２１６までの動作は、ＣＰＵ３０５が画像転送アプリケーションに従って動作することによって画像送信手段等として機能することによって実行される。
【0139】
ステップＳ２０３において、ＣＰＵ３０５は、ＵＳＢコネクタ３０１を介して無線デバイス１の画像転送中ランプ１５１の点灯要求を行う。この点灯要求を受けると無線デバイス１のＣＰＵ１０１は画像転送中ランプ１５１を点灯する。
【0140】
次に、ＣＰＵ３０５は、コンピュータ装置３の表示部であるＬＣＤ３０３に表示している画面（以下、「表示画面」とする。）に応じた画像データを画像投影装置２に送信を開始する。この処理は、ＣＰＵ３０５が、表示画像のデータをＵＳＢコネクタ３０１を介して無線デバイス１へ送信し、この無線デバイス１から無線通信によって画像投影装置２へ送信されるものであり、このように送信された表示画像データを画像投影装置２が受信すると、この表示画像データに基づいた画像をスクリーンに投影することになる。
【0141】
表示画像のデータを転送している状態で、ＣＰＵ３０５は、無線デバイス１の画像転送停止スイッチ１４０がＯＮにされたか否かを判定する（ステップＳ２０５）。ここで、無線デバイス１のＣＰＵ１０１は、画像転送停止スイッチ１４０が画像停止ＯＮモード側（スイッチＯＮ）へと操作されたことを検出すると、ＵＳＢコネクタ１０５を介してコンピュータ装置３にその旨の情報を通知する。この情報の通知を受けたとき、ＣＰＵ３０５は、無線デバイス１の画像転送停止スイッチ１４０がスイッチＯＮされたと判定することになる。
【0142】
ステップＳ２０５において、無線デバイス１の画像転送停止スイッチ１４０がスイッチＯＮへと操作されたと判定すると（ステップＳ２０５：ＹＥＳ）、ＣＰＵ３０５は、無線デバイスの画像転送中ランプ１５１を消灯させ（ステップＳ２０９）、処理をステップＳ２１０に移行する。無線デバイスの画像転送中ランプ１５１の消灯は、点灯時と同様に、ＣＰＵ３０５がＵＳＢコネクタ３０１を介して無線デバイス１の画像転送中ランプ１５１の消灯要求を行うことによって実行される。一方、無線デバイス１の画像転送停止スイッチ１４０がスイッチＯＮへと操作されていないと判定すると（ステップＳ２０５：ＮＯ）、ＣＰＵ３０５は、処理をステップＳ２０６に移行する。
【0143】
ステップＳ２１０において、ＣＰＵ３０５は、画像投影装置２に特定画像である黒画面表示指示コマンドを無線デバイス１を介して画像投影装置２へ送信して、処理をステップＳ２１１に移行する。
【0144】
ここで、黒画面表示指示コマンドの送信をＣＰＵ３０５の制御を行うこととしたが、無線デバイス１のＣＰＵ１０１が、画像転送停止スイッチ１４０がスイッチＯＮへと操作されたときに、黒画面表示指示コマンドの送信を行うようにしてもよい。この場合、
ステップＳ２１１において、ＣＰＵ３０５は、無線デバイス１の画像転送停止スイッチ１４０が画像停止ＯＦＦモード側（ＯＦＦ）へと操作されたか否かを判定する。ここで、無線デバイス１のＣＰＵ１０１は、画像転送停止スイッチ１４０がスイッチＯＦＦへと操作されたことを検出すると、ＵＳＢコネクタ１０５を介してコンピュータ装置３にその旨の情報を通知する。この情報の通知を受けたとき、ＣＰＵ３０５は、無線デバイス１の画像転送停止スイッチ１４０がスイッチＯＦＦへと操作されたと判定することになる。
【0145】

この処理において、無線デバイス１の画像転送停止スイッチ１４０がスイッチＯＦＦへと操作されたと判定すると（ステップＳ２１１：ＹＥＳ）、ＣＰＵ３０５は、処理をステップＳ２０６に移行する。

【0146】

ステップＳ２０６において、ＣＰＵ３０５は、画像投影装置２に対して時刻情報（現時刻の情報）を要求し、この要求に対して画像投影装置２から送信される時刻情報を取得して、処理をステップＳ２０７へ移行する。

【0147】

ステップＳ２０７において、ＣＰＵ３０５は、有効時間が経過したか否かを判定する。有効時間が経過したか否かの判定は、画像投影装置２から取得した時刻情報と無線デバイス１から読み込んだ無線設定情報とに基づいて行う。すなわち、有効時間が経過したか否かの判定を、画像投影装置２から取得した現時刻が無線デバイス１から読み込んだ無線設定情報に含まれる有効時間よりも遅い時間であるか否かにより判定する。

【0148】

この処理において、有効時間を経過したと判定すると（ステップＳ２０７：ＹＥＳ）、ＣＰＵ３０５は、タイムアウトメッセージをＬＣＤ３０３に表示して（ステップＳ２１２）、画像投影装置２との無線接続を切断する（ステップＳ２１３）。画像投影装置２との無線接続の切断は、無線デバイス１に対して、ＣＰＵ３０５が、画像投影装置２との無線接続の切断の要求を送信し、無線デバイス１がこの要求に応じることによって行われる。無線接続の切断を終了すると、ＣＰＵ３０５は、画像転送アプリケーションの実行を終了する（ステップＳ２１４）。

【0149】

また、有効時間が経過していない場合であっても、ＣＰＵ３０５は、有効時間まで所定時間（例えば、５分）を切ったと判定すると、有効時間を経過する前に有効時間を延長するように、ＬＣＤ３０３に有効時間が迫っている旨の表示を行う。このＬＣＤ３０３への表示に代えて或いは共に、ＣＰＵ３０５は、有効時間が迫っている旨の情報を無線デバイス１を介して画像投影装置２に送信し、画像投影装置２から投影する画像に、有効時間が迫っている旨の情報をスーパーインポーズさせるようにしてもよい。

【0150】

また、ステップＳ２０７において、有効時間を経過していないと判定すると（ステップＳ２０７：ＮＯ）、ＣＰＵ３０５は、無線デバイス１がコンピュータ装置３から抜かれたか否かを判定する（ステップＳ２０８）。この処理において、無線デバイス１がコンピュータ装置３から抜かれたと判定すると（ステップＳ２０８：ＹＥＳ）、ＣＰＵ３０５は、エラーメッセージをＬＣＤ３０３に表示して（ステップＳ２１５）、画像転送アプリケーションの実行を終了する（ステップＳ２１６）。一方、無線デバイス１がコンピュータ装置３から抜かれていないと判定すると（ステップＳ２０８：ＹＥＳ）、ＣＰＵ３０５は、処理をステップＳ２０５へ移行する。

【0151】

ステップＳ２０２において、画像転送アプリケーションが正常に動作していないとき（ステップＳ２０２：ＮＯ）、或いは、ステップＳ２１４の処理、ステップＳ２１６の処理が終了すると、ＣＰＵ３０５は、本メイン処理を終了する。

【0152】

次に、ステップＳ２０１におけるオートラン動作処理について、図１４を参照して説明する。図１４はコンピュータ装置におけるオートラン処理のフローチャートである。このオートラン動作は、無線デバイス１が接続されたときに、この無線デバイス１のＣＤ－ＲＯＭ認識部１２５の機能により、ＣＰＵ３０５が、無線デバイス１をＣＤ－ＲＯＭとして認識し、自動的に無線デバイス１の情報を読み込むことによって動作するものである。

【0153】

図１４に示すように、ＣＰＵ３０５は、自コンピュータ装置３にデバイスドライバ１３１がインストールされていないか否かを判定する（ステップＳ２２０）。この処理におい

て、デバイスドライバ１３１がインストールされていないと判定すると（ステップＳ２２０：ＹＥＳ）、ＣＰＵ３０５は、無線デバイス１のフラッシュメモリ１０４に記憶されている無線通信部１０７制御用のデバイスドライバ１３１をＵＳＢコネクタ３０１を介して読み出し、自コンピュータ装置３に対してこのデバイスドライバ１３１のインストール処理を施す（ステップＳ２２１）。

【0154】

ステップＳ２２１の処理が終了したとき、或いは、ステップＳ２２０において、デバイスドライバがインストールされていると判定したとき（ステップＳ２２０：ＹＥＳ）、ＣＰＵ３０５は、無線設定アプリケーションを起動し、無線デバイス１に保持されている無線設定情報をＵＳＢコネクタ３０１を介して読み出す（ステップＳ２２３）。

【0155】

次に、ＣＰＵ３０５は、ＷＬＡＮ（無線ＬＡＮ）のネットワークの設定を行う（ステップＳ２２４）。このネットワーク設定は、無線デバイス１に対して行うものである。すなわち、ＣＰＵ３０５は、ＵＳＢコネクタ３０１を介して、無線デバイス１に無線設定情報を送信し、無線デバイス１はこの無線設定情報に従ってＷＬＡＮのネットワークの設定を行う。ＷＬＡＮのネットワークの設定には、ＬＡＮ通信を行うためのＩＰアドレス、サブネットマスク、ＤＮＳのＩＰアドレスなどのＩＰネットワークの設定と、ネットワーク名や暗号キーなど無線通信に必要な情報の設定とがある。

【0156】

ステップＳ２２４の処理が終了すると、ＣＰＵ３０５は、画像投影装置２との無線通信が無線デバイス１を介して接続されているか否か、言い換えれば画像投影装置２とネットワーク接続がされているか否かを判定する（ステップＳ２２５）。この処理において、画像投影装置２とのネットワーク接続が行われていると判定すると（ステップＳ２２５：ＹＥＳ）、ＣＰＵ３０５は、画像転送アプリケーションを起動して実行する（ステップＳ２２６）。一方、画像投影装置２とのネットワーク接続が行われていないと判定すると（ステップＳ２２５：ＮＯ）、ＣＰＵ３０５は、エラーメッセージ表示処理を行う（ステップＳ２２７）。このエラーメッセージ表示処理は、ＣＰＵ３０５がＬＣＤ３０３にエラーメッセージを表示することによって行われる。

【0157】

ステップＳ２２６の処理、又はステップＳ２２７の処理が終了すると、本オートラン動作処理を終了する。

【0158】

なお、コンピュータ装置３のＣＰＵ３０５は、無線デバイス１の電源制御を行うようにしている。すなわち、無線デバイス１は、上述のようにメモリコントローラ機能部１２１と無線通信機能部１２３とを有しており、これらの電源をそれぞれ別々にＯＮ、ＯＦＦ制御できるようにしている。このようにメモリコントローラ機能部１２１と無線通信機能部１２３と個別にＯＮ，ＯＦＦすることできるので、ＵＳＢデバイスとしての限られた電力の範囲内で、信頼性の高い無線接続動作を実行することができる。例えば、ステップＳ２２０からＳ２２３においては、メモリコントローラ機能部１２１への電源をＯＮにし、無線通信機能部１２３への電源はＯＦＦにする。また、ステップＳ２２４からＳ２２７においては、メモリコントローラ機能部１２１への電源をＯＦＦにし、無線通信機能部１２３への電源はＯＮにするのである。また、無線デバイス１の記憶部に格納された画像転送アプリケーションをコンピュータ装置１のハードディスク３１５にコピーする場合には、メモリコントローラ機能部１２１への電源をＯＮにし、無線通信機能部１２３への電源はＯＦＦにする。

【0159】

以上のように本実施形態の画像投影システムＳでは、無線デバイス１は、無線部２０６を有し、無線部２０６で受信される画像データに応じた画像を投影する画像投影装置２に、画像データを無線通信により送信するコンピュータ装置３の無線部として機能するものである。この無線デバイス１には、画像投影装置２及びコンピュータ装置３のいずれにも

接続可能なＵＳＢコネクタ１０５と、画像投影装置２にＵＳＢコネクタ１０５を接続したときに、画像投影装置２から無線設定情報（無線通信の設定情報）を書き込み可能であり、かつコンピュータ装置３にＵＳＢコネクタ１０５を接続したときに、画像投影装置２から書き込まれた無線設定情報をコンピュータ装置３により読み出し可能なフラッシュメモリ１０４と、コンピュータ装置３にＵＳＢコネクタ１０５を接続したときに、画像投影装置２から書き込まれた無線設定情報に基づいた設定により画像投影装置２の無線部２０６と通信を行う無線通信部１０７とを備えたので、画像投影装置２によって設定された無線設定情報に基いて、画像投影装置２とコンピュータ装置３との間の通信を行うことができ、機密性の高い無線デバイス１或いは画像投影システムＳを提供することが可能となる。

【0160】

以上、本発明の実施の形態のうちのいくつかを図面に基づいて詳細に説明したが、これらは例示であり、当業者の知識に基づいて種々の変形、改良を施した他の形態で本発明を実施することが可能である。

【0161】

例えば、無線デバイス１と画像投影装置２及びコンピュータ装置３との間をＵＳＢ規格に基づく通信で説明したが、これに限られず、他の通信規格により通信を行うようにしてもよい。

【図面の簡単な説明】

【0162】

【図1】本実施形態における画像投影システムの全体構成図である。

【図2】本実施形態における画像投影システムにおける概略動作を説明するための図である。

【図3】本実施形態における無線デバイスの外観図である。

【図4】本実施形態における無線デバイスのブロック図である。

【図5】本実施形態における無線デバイスの機能ブロック図である。

【図6】図5のメモリコントローラ機能部のブロック図である。

【図7】本実施形態における画像投影装置のブロック図である。

【図8】本実施形態における画像投影装置の動作説明のためのフローチャートである。

【図9】本実施形態における無線設定情報の例を示す図である。

【図10】本実施形態における画像投影装置の動作説明のためのフローチャートである。

【図11】本実施形態における画像投影装置の動作説明のためのフローチャートである。

【図12】本実施形態におけるコンピュータ装置のブロック図である。

【図13】本実施形態におけるコンピュータ装置の動作説明のためのフローチャートである。

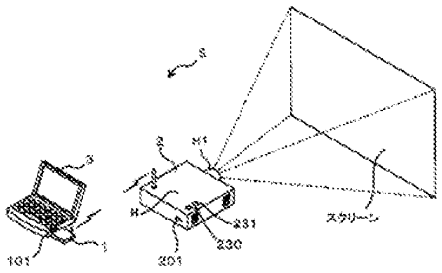
【図14】本実施形態におけるコンピュータ装置の動作説明のためのフローチャートである。

【符号の説明】

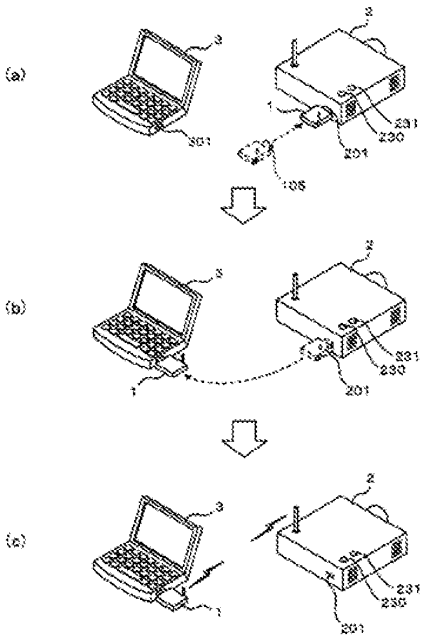
【0163】

１　無線デバイス
２　画像投影装置
３　コンピュータ装置３
１０１　無線デバイスのＣＰＵ（制御部）
１０４　フラッシュメモリ（記憶部）
２０３　画像投影装置の制御部
３０５　コンピュータ装置のＣＰＵ（制御部）

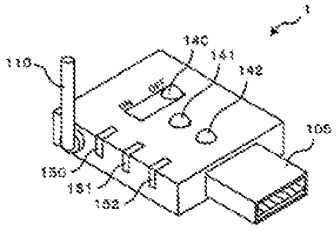
【図１】



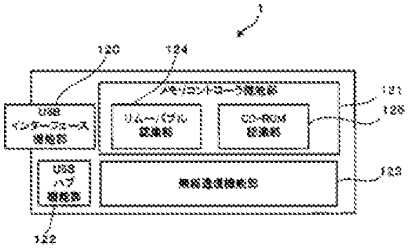
【図２】



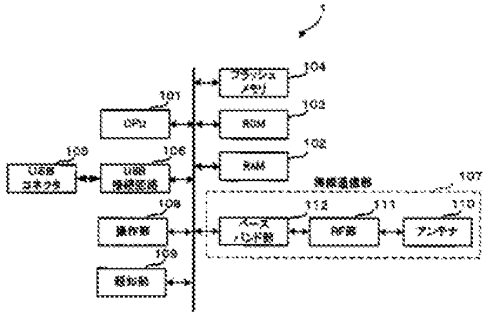
【図３】



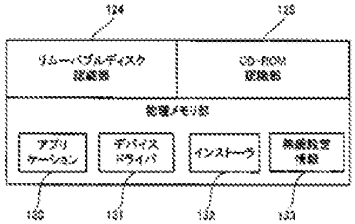
【図５】



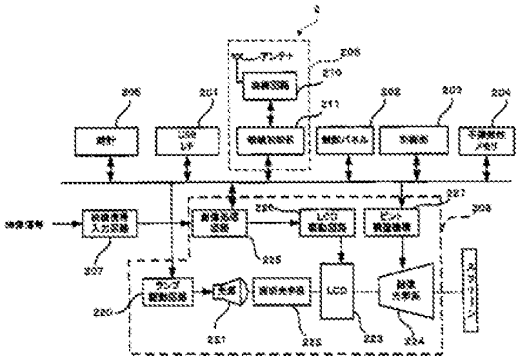
【図４】



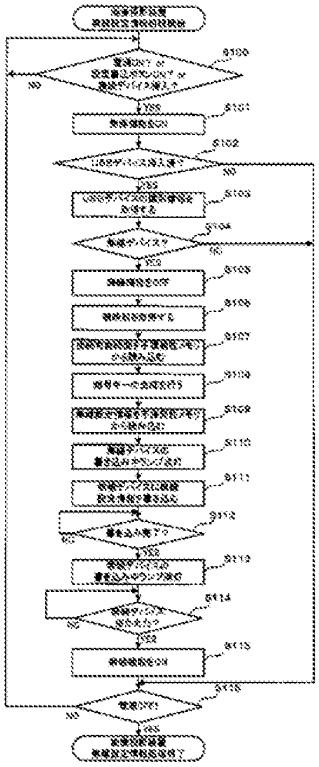
【図６】



【図7】



【図8】

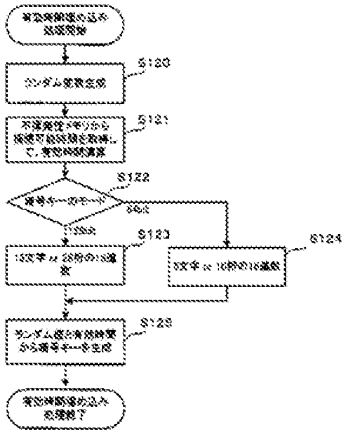


【図9】

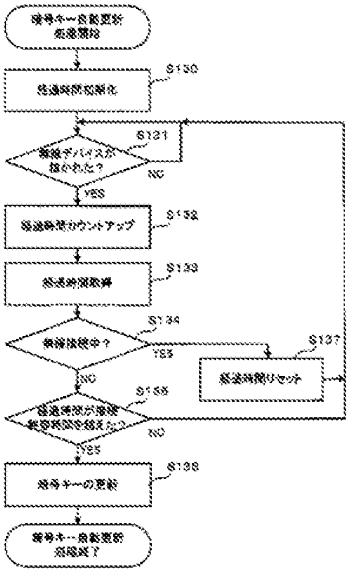
無線設定情報

バンド	IEEE802.11g
ネットワークモード	アドホックモード
ネットワーク名	Projector-net
無線チャンネル	11
認証レベル	オープンシステム
暗号化レベル	128ビット
データ暗号化	WEP
暗号キー	ga54121・・・
IPアドレス	192.168.0.3
サブネットマスク	255.255.255.0
DNS	192.168.0.1
有効時間	2008.01.01 18:00
接続可能時間	120min

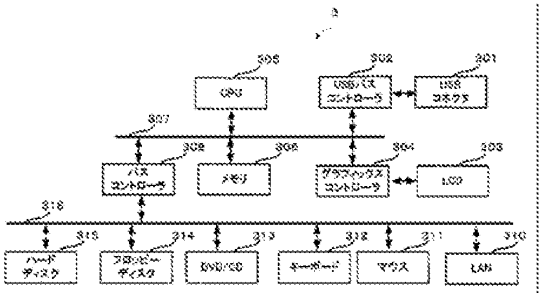
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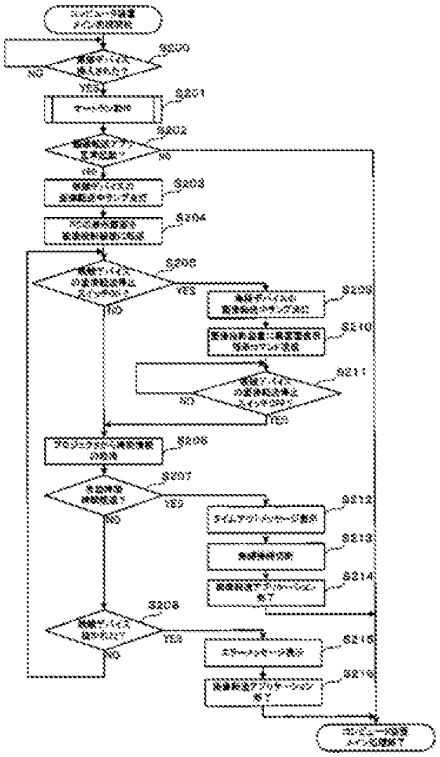
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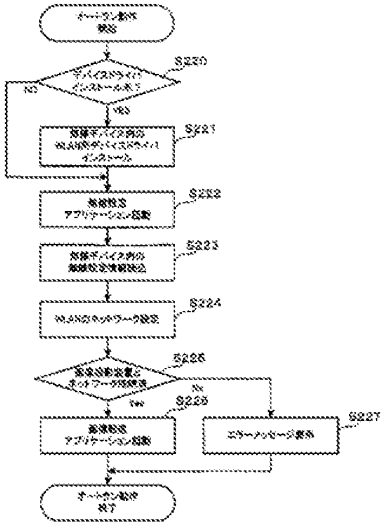
【図12】



【図13】



【図14】



(51)Int.Cl.			FI			テーマコード（参考）
Ｇ０９Ｇ	3/20	(2006.01)	Ｇ０９Ｇ	3/36		５Ｃ０８２
Ｇ０３Ｂ	21/00	(2006.01)	Ｇ０９Ｇ	3/20	６８０Ｃ	５Ｋ０１１
			Ｇ０９Ｇ	3/20	６３３Ｐ	
			Ｇ０３Ｂ	21/00	Ｄ	

Ｆターム(参考) 5C082 AA03 BB01 BD02 CB05 CB10 DA87 MM01 MM09
5K011 AA05 AA16 DA01 DA26 JA01 JA12 KA12 KA17

Electronic Patent Application Fee Transmittal

Application Number:	14344836
Filing Date:	03-Mar-2015
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Filer:	Thomas Lee/Kaitlyn Miller
Attorney Docket Number:	BEEL3004/BEU/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 - 1 month with $0 paid	1251	1	200	200
Miscellaneous:				
		Total in USD ($)		**200**

Electronic Acknowledgement Receipt	
EFS ID:	30215483
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:	30-AUG-2017
Filing Date:	03-MAR-2015
Time Stamp:	10:09:02
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$200
RAM confirmation Number	083017INTEFSW00013295020200
Deposit Account	020200
Authorized User	Kaitlyn Miller
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.17 (Patent application and reexamination processing fees) 37 CFR 1.19 (Document supply fees)	

37 CFR 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	Amendment/Req. Reconsideration-After Non-Final Reject	BEEL3004_nfoa_rply_23AUG17.pdf	162199 b7dff28758bccf34aad588d1c5d909e69888fb09	no	8
Warnings:					
Information:					
2	Extension of Time	BEEL3004_EOT_Form.pdf	156796 c1f3ea8b8b5dcca38d7bf0c2196c3111dca11f90	no	2
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	BEEL3004_IDS_SB08.pdf	612479 b6d6e69ee9f8280900e5f17c1b593b1a125894f9	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.					
4	Non Patent Literature	CN_OA_04JUL17_filing.pdf	1436080 70892e9b279aaa78f541b0003846e3819e430380	no	7
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Information:					
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Warnings:					
Information:					

6	Non Patent Literature	CN_OA_28JUN17_filing.pdf	4105472 6fa9007af2aba4f3b33bf50b8d0bec6ff9659924	no	13
Warnings:					
Information:					
7	Non Patent Literature	EP_SrchRpt_01AUG17.pdf	516082 7a7e1b465a72151f7908fe03f4914093a46888e9	no	7
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8	Foreign Reference	EP1329055A2.pdf	3512157 6935ed800028d948c22628af003b5285dd255967	no	91
Warnings:					
Information:					
9	Foreign Reference	JP2008090561A_filing.pdf	18017418 9a6eb2859a843605c7eb36cbfa03c01b70c6778d	no	56
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10	Fee Worksheet (SB06)	fee-info.pdf	30702 624dc3e64d04708514f255cba7adb9d59ae7955	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	29665001		

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.

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	Christopher A. Bartels
	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
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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	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	Christopher A. Bartels
	Attorney Docket Number	BEEL3004/BEU/TL

	1	Chinese Office Action dated April 5, 2017, for CN 201280055744.2, and English translation thereof.	

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	Christopher A. Bartels
	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)	2017-05-19
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.

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:	29259635
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-MAY-2017
Filing Date:	03-MAR-2015
Time Stamp:	15:20:58
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	612099 875a22cd55bcaded6bedb472669571144c43c70c	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	CN_OA_05APR17_filing.pdf	2717614 e9a3a32427cae55a650e6d928600376080fab4d2	no	10
Warnings:					
Information:					
			Total Files Size (in bytes):	3329713	

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
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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/BEU/TL	1046

23364 7590 05/03/2017

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

EXAMINER	
BARTELS, CHRISTOPHER A.	

ART UNIT	PAPER NUMBER
2184	

NOTIFICATION DATE	DELIVERY MODE
05/03/2017	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

Office Action Summary	Application No. 14/344,836	Applicant(s) BEEL ET AL.	
	Examiner CHRISTOPHER BARTELS	Art Unit 2184	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *3/13/2014*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-102* is/are pending in the application.

5a) Of the above claim(s) *1-81* is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *82-102* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *03/13/2014* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *See Continuation Sheet*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Continuation of Attachment(s) 2). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date: 3/13/2014, 10/09/2014, 10/31/2014, 07/21/2015, 02/04/2016, 05/25/2016, 09/19/2016, 01/06/2017, 02/03/2017, 02/15/2017.

1. The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

2. Claims 1-81 were cancelled. As of 03/13/2014, clams 82-102 are pending.

Drawings

3. The drawings were received on 08/05/2016. These drawings are accepted.

Information Disclosure Statement

4. The information disclosure statements (IDS) submitted on 3/13/2014, 10/09/2014, 10/31/2014, 07/21/2015, 02/04/2016, 05/25/2016, 09/19/2016, 01/06/2017, 02/03/2017, and 02/15/2017. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim(s) 82-85, 87-95 and 97-102 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Nuyttens et al. (USPGPUB No. ***2007/0033289 A1***, *hereinafter referred to as Nuyttens*).

Referring to claim 82, Nuyttens discloses a method for connecting a processing device {CPU mezzanine board 47, see Fig. 8, [0116], lines 1-3} ***to a communications network*** {"eth 1000", see Fig. 7, [0112].}, ***the processing device having a memory*** {"flash 33", see Fig. 7.}, ***a display*** {Monitor coupled to graphic accelerator 44, see Fig. 8, [0117].} ***and an operating system*** {Windows or Linux, see Fig. 8, [0117].} ***with pre-installed generic drivers providing a generic communications protocol*** {PCI express to couple peripheral devices, [0116], first 4 lines, see Fig. 8.} ***for communication between processing device and a standard class of peripheral devices, the method comprising:***

a) coupling a peripheral device {peripheral device "drawing unit 40", see Fig. 8, [0116], lines 1-3.} ***to the processing device, the peripheral device having a transceiver*** {"panellink transmitter 51", see Fig. 8, -3.};

b) setting up, by means of a first pre-installed generic audio driver of the operating system, a means for audio

communication {"proprietary busses used for transporting video, audio…", [0088].} ***between the peripheral device and the processing device and by means of a second pre-installed generic driver*** {multi-viewer driver 2, see Fig. 7, [0112].} ***of the operating system, a means for data communication*** {"metadata with building blocks based on standard IP and compression technologies", [0088].} ***between the peripheral device and the processing device;***

c) coupling the processing device to a communications network {RJ45 MAC PHY, see Figs. 7 and 8, last 4 lines of [0112].} ***via the peripheral device;***

d) routing audio data between the processing device and the communication network {"a characteristic of such a [communication] network is to… route data from one address to another", [0088].} ***via the means for audio communication, wherein the first pre-installed generic audio driver is used for transferring the audio data*** {"inserting the decoded image [and corresponding audio] on the internal bus of the [pre-installed generic audio driver] the multi-viewer driver 2", [0112].} ***between the processing device and the peripheral device.***

As per claim 83, the rejection of claim 82 is incorporated and Nuyttens discloses wherein Step b) comprises presenting the peripheral device to the processing device as a human interface device {"proper mouse and keyboard", [0006].} ***and wherein the pre-installed generic driver is a human interface device driver*** {"human machine interface is composed of several displays", [0006].}.

As per claim 84, the rejection of claim 82 is incorporated and Nuyttens discloses wherein Step b) comprises presenting the peripheral device to the processing device as a mass storage device {"such as a storage device which is part of mass storage", [0252].} ***and wherein the pre-installed generic driver is a mass storage device driver.***

As per claim 85, the rejection of claim 82 is incorporated and Nuyttens discloses wherein Step b) comprises presenting the peripheral device to the processing device as a composite device {"human machine interface is [a composite] of several displays", [0006].} ***and wherein pre-installed generic drivers drive different device interfaces independently*** {"each compression decoding device 45 may work independently of the other compression decoding devices 45", [0138].}.

As per claim 87, the rejection of claim 86 is incorporated and Nuyttens discloses wherein the client application is a portable application {"standard [portable] X.11 methods can be used to feed this information to the DGU 14", [0172], [0171].}.

As per claim 88, the rejection of claim 82 is incorporated and Nuyttens discloses wherein the peripheral device is adapted to anal se an incoming signal {the Examiner is presuming the claim language meant to say "analyse an incoming signal".} ***from the processing device and if no audio is received, the incoming signal is discarded*** {"monitoring elements within a [incoming signal] source (audio metering) in an effective way", [0175].}.

As per claim 89, the rejection of claim 88 is incorporated and Nuyttens discloses wherein if audio is received, the peripheral device will initiate an additional connection to the base unit {base unit "baseboard of the multi-viewer driver 2", [0112].} ***through the communications network.***

As per claim 90, the rejection of claim 82 is incorporated and Nuyttens discloses wherein further comprising time-stamping synchronously the audio with the data stream {time-stamping

"Real time encoding at full frame rate… [for the data stream] in-sports events phases", [0109].}.

As per claim 91, the rejection of claim 90 is incorporated and Nuyttens discloses wherein further comprising encoding, optionally encrypting {encoding "the document [into] SGML, XML, SVG" and so on ([0044]), where the XML format is well-known for encrypting functionalities.} ***the audio data.***

Referring to claims 92-95, and 98-101 are system claims reciting claim language corresponding to the method claim of claims 81-85, 87-91, respectively, thereby rejected under the same rationale as claims 81-85, 87-91.

As per claim 97, the rejection of claim 96 is incorporated and Nuyttens wherein the client application is a portable application {"X.11 windows" known for its' portability and versatility in different platforms, [0171].}.

Referring to claims 102 is an apparatus claim reciting claim language corresponding to the method claim of claims 81-91, respectively, thereby rejected under the same rationale as claims 81-91.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 86 and 96 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nuyttens in view of Carlson et al. (USPGPUB No. ***2013/0060662 A1***, *hereinafter referred to as Carlson*).

As per claim 86, the rejection of claim 82 is incorporated however Nuyttens does not appear to disclose any limitation in this dependent claim.

Furthermore, Carlson discloses ***wherein a client application is stored on the peripheral device which when run on the processing device obtains screen scraped data*** {client application "Product catalog system 130" (see Fig. 1) obtaining screen scraped data "screen scraping mechanism", [0023].}.

Nuyttens and Carlson are analogous art because they are from the same field of endeavor, methods and systems communicating with networked peripherals.

At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Nuyttens and Carlson before him or her, to modify Nuyttens' "graphics accelerator 44" incorporating Carlson's "screen scraping mechanism".

The suggestion/motivation for doing so would have been to provide and facilitate the creation of user interfaces that organize results to reduce cognitive load on the user (Carlson [0003], lines 4-6).

Therefore, it would have been obvious to combine Carlson with Nuyttens to obtain the invention as specified in the instant claim(s).

As per claim 96, the rejection of claim 92 is incorporated however Nuyttens does not appear to disclose any limitation in this dependent claim.

Furthermore, Carlson discloses ***wherein a client application is stored on the peripheral device which when run on the processing device obtains screen scraped data*** {client application "Product catalog system 130" (see Fig. 1) obtaining screen scraped data "screen scraping mechanism", [0023].}.

The 103 motivation for this dependent claim relied upon as recited in claim 86 above.

Conclusion

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER A. BARTELS whose telephone number is (571)270-3182. The examiner can normally be reached on Monday To Thursday ; 7:30am to 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Henry Tsai can be reached on (571) 272-4176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. A. B./

/HENRY TSAI/
Supervisory Patent Examiner, Art Unit 2184

Notice of References Cited	Application/Control No. 14/344,836	Applicant(s)/Patent Under Reexamination BEEL ET AL.	
	Examiner CHRISTOPHER BARTELS	Art Unit 2184	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2007/0033289 A1	02-2007	Nuyttens; Geert	H04N9/12	709/230
*	B	US-8,346,753 B2	01-2013	Hayes; Paul V	G06F17/30864	707/709
*	C	US-2013/0060662 A1	03-2013	Carlson; Andy	G06Q30/06	705/26.61
	D	US-				
	E	US-				
	F	US-				
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	H	US-				
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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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

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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	2184
Examiner Name	CHRISTOPHER BARTELS
Attorney Docket Number	BEEL3004/TJM/TL

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	Art Unit	
	Examiner Name	
	Attorney Docket Number	BEEL3004/TJM/TL

/C.A.B/	1	Martin Trautschold, iPhone 4 Made Simple, 2010, Apress, Pages 1-819.	☐

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Examiner Signature	/CHRISTOPHER A BARTELS/	Date Considered	04/03/2017

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	Art Unit	
	Examiner Name	
	Attorney Docket Number	BEEL3004/TJM/TL

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

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☐ See attached certification statement.

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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)	2014-10-31
Name/Print	THOMAS J. MOORE	Registration Number	28,974

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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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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.

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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 2184
Examiner Name	~~Dean Phan~~ CHRISTOPHER BARTELS
Attorney Docket Number	BEEL3004/TJM/TL

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	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	Dean Phan
	Attorney Docket Number	BEEL3004/TJM/TL

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/C.A.B/	1	European Office Communication dated June 15, 2015, for EP 12762258.7.	☐

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

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14344836	BEEL ET AL.
	Examiner	**Art Unit**
	CHRISTOPHER BARTELS	2184

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	04/27/2017								
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Final	Original	04/27/2017								
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14344836	BEEL ET AL.
	Examiner	**Art Unit**
	CHRISTOPHER BARTELS	2184

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	04/27/2017								
	73	-								
	74	-								
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	76	-								
	77	-								
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	96	✓								
	97	✓								
	98	✓								
	99	✓								
	100	✓								
	101	✓								
	102	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14344836	BEEL ET AL.
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	CHRISTOPHER BARTELS	2184

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
inventor search performed in East (USPAT USOCR USPGPUB)	04/03/2017	C.A.B.
Text search performed in East (ALL DATABASES)	04/03/2017	C.A.B.

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/C.B./ Examiner.Art Unit 2184	

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

PTO/SB/08a (01-10)
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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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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
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	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]
/C.A.B/	1	2007/137415	WO	A1	2007-12-06	SMART TECH INC	cited in EP Office Communication	

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	Examiner Name	Dean Phan
	Attorney Docket Number	BEEL3004/TJM/TL

/C.A.B/	1	European Office Communication dated December 21, 2015, for EP 12762258.7.	

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Examiner Signature	/CHRISTOPHER A BARTELS/	Date Considered	04/03/2017

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	Examiner Name	Dean Phan
	Attorney Docket Number	BEEL3004/TJM/TL

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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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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.

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

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

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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
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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
/C.A.B/	1	20110023096	A1	2011-01-27	XIAO et al.	cited in Office Action
/C.A.B/	2	20070033289	A1	2007-02-08	NUYTTENS et al.	
/C.A.B/	3	20140082227	A1	2014-03-20	BEEL et al.	

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	Examiner Name	Heny Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

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/C.A.B/	1	US Office Action dated March 29, 2016, for 14/395,364.	
/C.A.B/	2	Marc AL-HAMES et al., Audio-Visual Processing in Meetings: Seven Questions and Current AMI Answers, 2006.	
/C.A.B/	3	Mood indicators on electronic meeting tools" IBM, IP.com number: IPCOMOOOO1171D, Publication Date: March 12, 2003.	

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Examiner Signature	/CHRISTOPHER A BARTELS/	Date Considered	04/03/2017

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☒ A certification statement is not submitted herewith.

SIGNATURE

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

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Application Number	14344836
Filing Date	2014-03-13
First Named Inventor	Koen Simon Herman BEEL
Art Unit	2184
Examiner Name	XXXXXXXXX, CHRISTOPHER BARTELS Unassigned
Attorney Docket Number	BEEL3004/TJM/TL

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	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	
	Examiner Name	Unassigned
	Attorney Docket Number	BEEL3004/TJM/TL

/C.A.B/	1	International Preliminary Report on Patentability (IPRP) dated March 27, 2014, for PCT/EP2012/068166.	☐
/C.A.B/	2	International Preliminary Report on Patentability (IPRP) dated March 27, 2014, for PCT/EP2012/068167.	☐
/C.A.B/	3	International Preliminary Report on Patentability (IPRP) dated March 27, 2014, for PCT/EP2012/068168.	☐

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Signature	/Thomas J. Moore/	Date (YYYY-MM-DD)	2014-10-09
Name/Print	THOMAS J. MOORE	Registration Number	28974

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

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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
/C.A.B/	1	20110179182	A1	2011-07-21	VADLA RAVNAS	cited in EP Search Report
/C.A.B/	2	20050015719	A1	2005-01-20	MARCHON et al.	cited in EP Search Report
/C.A.B/	3	20090300520	A1	2009-12-03	Ashutosh	
/C.A.B/	4	20050122392	A1	2005-06-09	Johansen	
/C.A.B/	5	20090092198	A1	2011-04-21	Miyata	

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/C.A.B/	1	1476242	CN	A	2004-02-18	SEIKO EPSON CORP	English abstract of corresponding EP 1385336, cited in CN OA	☒
	2	2010/105335	WO	A1	2010-09-23	SMART TECHNOLOGIES ULC	cited in CN OA	☐
	3	102045864	CN	A	2011-05-04	NEC CASIO MOBILE COMM LTD	English abstract (Corresponds U.S. 2011/0092198), cited in CN OA	☒
	4	101631223	CN		2011-04-20	SHANGHAI HUAPING INFORMATION TECHNOLOGY CO LTD	Cited in CN OA dated 10-10-16, English abstract	☒
	5	101454762	CN		2013-06-12	SMART TECHNOLOGIES ULC	Cited in CN OA dated 10-10-16, English abstract	☒
	6	1550996	CN		2004-12-01	SEIKO EPSON CORP	Cited in CN OA dated 10-14-16, English abstract	☒
	7	101965609	CN		2011-02-02	SMART TECHNOLOGIES ULC	Cited in CN OA dated 10-14-16, English abstract	☒
/C.A.B/	8	1385336	EP	A2	2004-01-28	SEIKO EPSON CORP		☐

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/C.A.B/	1	European Extended Search Report dated November 3, 2016, for EP 16170760.9.	
/C.A.B/	2	Chinese Office Action dated October 14, 2016, for CN 201280055744.2.	
/C.A.B/	3	Chinese Office Action dated October 10, 2016, for CN 201280055667.0.	
/C.A.B/	4	Office Action in corresponding U.S. app. 14/344,830 dated October 6, 2016.	
/C.A.B/	5	Final Office Action in corresponding U.S. app. 14/395,364 dated November 2, 2016.	

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Examiner Signature	/CHRISTOPHER A BARTELS/	Date Considered	04/03/2017

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[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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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)	2017-01-06
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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Examiner Name	~~XXXXXXXX~~ CHRISTOPHER BARTELS
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/C.A.B/	1	20020174254	A1	2002-11-21	KITA et al.	corresponds to CN 1689275

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/C.A.B/	1	1689275	CN	A	2005-10-26	SONY CORP	English abstract, corresponds to US 20020174254	X

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/C.A.B/	1	Chinese Office Action dated November 4, 2016, for CN 201280001542.X, and English translation thereof.	

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/C.A.B/	1	20040128354	A1	2004-07-01	HORIKIRI et al.	corresponds to CN 1499841
/C.A.B/	2	20100066806	A1	2010-03-18	LYU	cited in corresponding US OA
/C.A.B/	3	20070109410	A1	2007-05-17	SIEW	cited in corresponding US OA
/C.A.B/	4	20110150433	A1	2011-06-23	ALEXANDROV et al.	cited in CN OA

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/C.A.B/	1	1499841	CN	A	2004-05-26	FUJI XEIOX CO LTD	cited in CN OA, corresponds to US 20040128354	☒
	2	101106681	CN	A	2008-01-16	VTRON CORP	cited in CN OA, English machine translation	☒
	3	1788494	CN	A	2006-06-14	TELESUIT CORP	cited in CN OA, English abstract	☒
	4	101022529	CN	A	2007-08-22	LIXING INTERNAT SCIENCE & TECH	cited in CN OA, English abstract	☒
	5	101106469	CN	A	2008-01-16	AWIND INC	cited in CN OA, English abstract	☒
	6	101442500	CN	A	2009-05-27	XIAOTAO YIN	cited in CN OA, English abstract	☒
	7	101828392	CN	A	2010-09-08	CREATIVE TECH LTD	cited in CN OA, English abstract	☒
/C.A.B/	8	102023852	CN	A	2011-04-20	UULONG EDUCATIONAL TECHNOLOGY CO LTD	cited in CN OA, English abstract	☒

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/C.A.B/	1	Chinese Office Action dated December 27, 2016, for CN 201280074077.2, and English translation thereof.	

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	2181
	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

/C.A.B/	2	Final Office Action in corresponding U.S. App. 14/725,401 dated January 26, 2017.
/C.A.B/	3	Final Office Action in corresponding U.S. App. 14/278,442 dated January 26, 2017.

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EXAMINER SIGNATURE

Examiner Signature	/CHRISTOPHER A BARTELS/	Date Considered	04/03/2017

*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
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2181
	Examiner Name	Henry 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)	2017-02-15
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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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.

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

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	
	Filing Date	
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	CHRISTOPHER BARTELS
	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
/C.A.B/	1	6966035	B1	2005-11-15	Suess et al.	Cited in Specification
/C.A.B/	2	8316138	B2	2012-11-20	Chang	

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/C.A.B/	1	20100087139	A1	2010-04-08	Glass	Cited in Specification and German Search Report
/C.A.B/	2	20060095376	A1	2006-05-04	Mitchell et al.	Cited in Specification
/C.A.B/	3	20090198839	A1	2009-08-06	Banerjee et al.	Cited in Specification
/C.A.B/	4	20110115689	A1	2011-05-19	Sugiyama et al.	Cited in Specification

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.A.B/

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	Filing Date	
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	
	Examiner Name	
	Attorney Docket Number	BEEL3004/TJM/TL

/C.A.B/	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
/C.A.B/	15	20090046139	A1	2009-02-19	Cutler et al.	Cited in German Search Report

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

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/C.A.B/	1	00/52887	WO	A1	2000-09-08	MICROSOFT CORPORATION	Cited in PCT/EP2012/068169	☐
/C.A.B/	2	1246395	EP	A1	2002-10-02	MOTOROLA, INC.	Cited in PCT/EP2012/068169	☐
/C.A.B/	3	1187480	EP	A1	2002-03-13	TELESUITE CORP.	Cited in ISR and PCT/EP2012/068168	☐

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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]
/C.A.B/	1	International Search Report (ISR) dated March 6, 2013, for PCT/EP2012/068166.	☐
/C.A.B/	2	International Search Report (ISR) dated March 19, 2013, for PCT/EP2012/068167.	☐
/C.A.B/	3	International Search Report (ISR) dated March 4, 2013, for PCT/EP2012/068168.	☐
/C.A.B/	4	International Search Report (ISR) dated January 28, 2013, for PCT/EP2012/068169.	☐

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	Filing Date	
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	
	Examiner Name	
	Attorney Docket Number	BEEL3004/TJM/TL

/C.A.B/	5	British Search Report dated August 28, 2012, for GB 1206841.7.	☐
/C.A.B/	6	German Search Report dated November 17, 2011, for DE 102011055443.2.	☐
/C.A.B/	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)	☐

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

EXAMINER SIGNATURE

Examiner Signature	/CHRISTOPHER A BARTELS/	Date Considered	04/03/2017

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☒ A certification statement is not submitted herewith.

SIGNATURE

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Signature	/Thomas J. Moore/	Date (YYYY-MM-DD)	2014-03-13
Name/Print	THOMAS J. MOORE	Registration Number	28974

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.A.B/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	10	(("BEEL") near3 ("Koen")).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2017/04/03 13:24
L2	11	(("NIR") near3 ("Yoav")).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2017/04/03 13:24
L3	10	(("LOUWET") near3 ("Filip")).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2017/04/03 13:24
L4	15	(("COEN") near3 ("Guy")).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2017/04/03 13:24
S1	2	"20150169477"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/03/10 20:50
S2	204	(audio near2 driver audio adj driver) and (hmi human near2 (machine interface)) and (usb with (mass storage class))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 08:30
S3	1	S2 and screen near2 scrap$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 08:30
S4	12070	(web data screen) near2 scrap$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 08:33
S5	95	(web data screen) near2 scrap$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2017/04/03 08:34
S7	13	"2007137415"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 08:43
S8	3	"20070137415"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 08:43
S9	9	("20110023096" "20070033289" "20140082227").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 08:47

S10	2	"20020174254"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 08:57
S11	1	(S7 S8 S9 S10) and screen near2 scrap$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 09:05
S12	95	(web data screen) near2 scrap$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2017/04/03 10:57
S13	77	S12 and (portable cellular pda smartphone smart adj phone mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 10:57
S14	2	"20020174254"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 10:59
S15	9	("20110023096" "20070033289" "20140082227").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/04/03 10:59
S16	8	S12 and usb	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2017/04/03 11:03

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CONFIRMATION NO. 1046

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/344,836	03/03/2015 RULE	710	2184	BEEL3004/BEU/TL

APPLICANTS

INVENTORS

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

**** CONTINUING DATA ***************************

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 ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
03/10/2015

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /CHRISTOPHER A. BARTELS/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		BELGIUM	6	21	3

ADDRESS

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

TITLE

ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

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

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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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~~ CHRISTOPHER BARTELS
Attorney Docket Number	BEEL3004/BEU/TL

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/C.A.B/	1	20090064302	A1	2009-03-05	COLELLA	

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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

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]
/C.A.B/	1	European Office Action dated August 1, 2016, for EP 12762258.7.	
/C.A.B/	2	U.S. Office Action dated June 17, 2016, for 14/278,442.	
/C.A.B/	3	U.S. Office Action dated June 17, 2016, for 14/725,401.	

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	First Named Inventor	Koen Simon Herman BEEL
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	Examiner Name	Eric T. Oberly
	Attorney Docket Number	BEEL3004/BEU/TL

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

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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.

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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.

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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/BEU/TL

CONFIRMATION NO. 1046

23364
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OC000000089376705

Date Mailed: 02/22/2017

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The request for voluntary publication, amended publication, early publication, redacted publication, republication, corrected publication or revised publication has been received for this application. The request, including payment of any necessary fee(s), is in compliance with 37 CFR 1.215, 1.217, 1.219 or 1.221.

The projected publication date is 06/01/2017.

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Application Number	14344836
Filing Date	2015-03-03
First Named Inventor	Koen Simon Herman BEEL
Art Unit	2181
Examiner Name	Henry Tsai
Attorney Docket Number	BEEL3004/BEU/TL

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	2	20100066806	A1	2010-03-18	LYU	cited in corresponding US OA
	3	20070109410	A1	2007-05-17	SIEW	cited in corresponding US OA
	4	20110150433	A1	2011-06-23	ALEXANDROV et al.	cited in CN OA

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	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

	1	1499841	CN	A	2004-05-26	FUJI XEIOX CO LTD	cited in CN OA, corresponds to US 20040128354	☒
	2	101106681	CN	A	2008-01-16	VTRON CORP	cited in CN OA, English machine translation	☒
	3	1788494	CN	A	2006-06-14	TELESUIT CORP	cited in CN OA, English abstract	☒
	4	101022529	CN	A	2007-08-22	LIXING INTERNAT SCIENCE & TECH	cited in CN OA, English abstract	☒
	5	101106469	CN	A	2008-01-16	AWIND INC	cited in CN OA, English abstract	☒
	6	101442500	CN	A	2009-05-27	XIAOTAO YIN	cited in CN OA, English abstract	☒
	7	101828392	CN	A	2010-09-08	CREATIVE TECH LTD	cited in CN OA, English abstract	☒
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	1	Chinese Office Action dated December 27, 2016, for CN 201280074077.2, and English translation thereof.	

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	2	Final Office Action in corresponding U.S. App. 14/725,401 dated January 26, 2017.	
	3	Final Office Action in corresponding U.S. App. 14/278,442 dated January 26, 2017.	

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Signature	/Thomas Lee/	Date (YYYY-MM-DD)	2017-02-15
Name/Print	THOMAS LEE	Registration Number	66396

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US 20040128354A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2004/0128354 A1**

Horikiri et al. (43) **Pub. Date: Jul. 1, 2004**

(54) **TELECONFERENCE SYSTEM, TELECONFERENCE SUPPORT METHOD, AND COMPUTER PROGRAM**

(75) Inventors: **Kazunori Horikiri**, Tokyo (JP); **Yoshiki Watanabe**, Tokyo (JP); **Makoto Yamazaki**, Tokyo (JP); **Yasuhiro Ogasawara**, Kanagawa (JP)

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ALEXANDRIA, VA 22320 (US)

(73) Assignee: **FUJI XEROX CO., LTD.**, TOKYO (JP)

(21) Appl. No.: **10/694,213**

(22) Filed: **Oct. 28, 2003**

(30) **Foreign Application Priority Data**

Oct. 29, 2002 (JP) 2002-314913
Oct. 8, 2003 (JP) 2003-349114

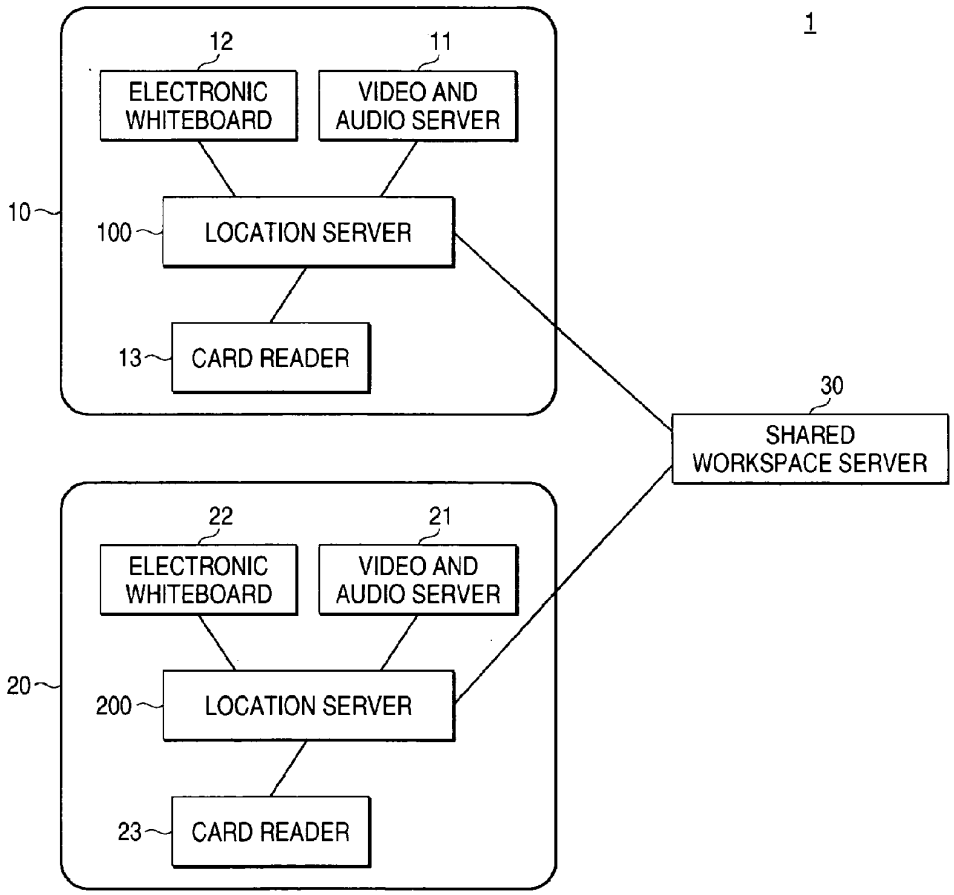
Publication Classification

(51) **Int. Cl.**[7] **G06F 15/16**; G06F 15/173

(52) **U.S. Cl.** **709/204**; 709/223

(57) **ABSTRACT**

In a shared workspace, a session for managing connection of conference systems, a file used in a conference and created as a record of the conference, reference information to a resource relevant to the conference, and history information of file access made by conference participants are managed. The conference participant can operate a GUI, thereby connecting to the conference system without being aware of the call address of each conference system and easily accessing information in the files relevant to the conference and the like from the conference system.



[19] 中华人民共和国国家知识产权局

[51] Int. Cl[7]
H04N 7/15
H04L 12/28 H04L 12/16
H04M 3/56

[12] 发明专利申请公开说明书

[21] 申请号 200310103058.0

[43] 公开日 2004 年 5 月 26 日

[11] 公开号 CN 1499841A

[22] 申请日 2003.10.29
[21] 申请号 200310103058.0
[30] 优先权
[32] 2002.10.29 [33] JP [31] 314913/2002
[32] 2003.10.8 [33] JP [31] 349114/2003
[71] 申请人 富士施乐株式会社
地址 日本东京
[72] 发明人 堀切和典 渡辺美树 山崎诚
小笠原康裕

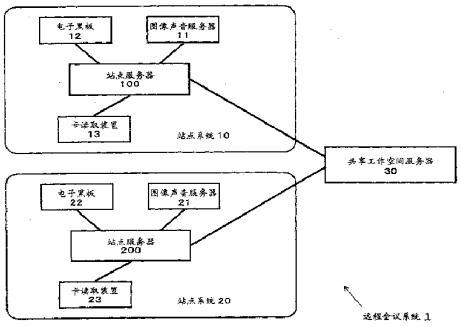
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[54] 发明名称 远程会议系统和远程会议支持方法以及计算机程序

[57] 摘要

本发明提供一种远程会议系统和远程会议支持方法以及计算机程序，其提供参加者能容易与其他的会议参加者进行会议系统间的连接或信息共享的共享工作空间。在共享工作空间中管理以下内容：管理会议系统间的连接的会话；会议中使用或作为会议记录生成的文件；与会议相关的资源的引用信息；由会议参加者进行的文件访问等的历史信息。参加者通过 GUI 操作，可以不必知道各个会议系统的调用地址就能进行会议系统的连接，容易从会议系统访问与会议相关的文件等信息。



ISSN1008-4274

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6. 根据权利要求1～5中任一项所述的远程会议系统，其特征在于，所述共享工作空间服务器根据由所述站点系统发送的用户识别信息来选择工作空间。

7. 根据权利要求1～5中任一项所述的远程会议系统，其特征在于，所述共享工作空间服务器根据所述站点系统利用IC卡发送的用户识别信息来选择工作空间。

8. 根据权利要求1～7中任一项所述的远程会议系统，其特征在于，所述共享工作空间服务器根据用于确定由所述站点系统发送的工作空间的信息来选择工作空间。

9. 根据权利要求1～7中任一项所述的远程会议系统，其特征在于，所述共享工作空间服务器根据用于确定所述站点系统基于保持在IC卡中的信息而发送的工作空间的信息来选择工作空间。

10. 根据权利要求2所述的远程会议系统，其特征在于，所述共享工作空间服务器响应来自站点系统的文件参照请求，起动用于参照文件的应用程序，同时对确立会话的各站点系统提供针对应用程序的输入输出界面。

11. 根据权利要求10所述的远程会议系统，其特征在于，在文件参照请求所请求的文件未事先登记在工作空间内时，所述共享工作空间服务器临时登记该文件。

12. 根据权利要求2所述的远程会议系统，其特征在于，站点系统起动用于对参照请求文件进行参照的应用程序，同时对确立会话的其他站点系统提供针对应用程序的输入输出界面。

13. 根据权利要求12所述的远程会议系统，其特征在于，站点系统从其他站点系统接收请求参照的文件，起动用于参照该文件的应用程序，同时对确立会话的其他站点系统提供针对应用程序的输入输出界面。

14. 一种支持实现多个会议系统间的协作的远程会议支持方法，其特征在于，具有：

提供由一个或一个以上会话构成的工作空间的步骤；

响应用户对工作空间的选择，打开工作空间的步骤；

把已打开的工作空间追加到活动工作空间的步骤；和

管理工作空间的利用的步骤。

15. 根据权利要求14所述的远程会议支持方法，其特征在于，还具有：提供显示用于用户进行工作空间选择操作的候补工作空间的用户界面的步骤。

16. 根据权利要求14所述的远程会议支持方法，其特征在于，所述管理工作空间的利用的步骤包括：提供用于对文件及/或资源进行引用的用户界面的步骤。

17. 根据权利要求14所述的远程会议支持方法，其特征在于，所述管理工作空间的利用的步骤包括：登记对文件及/或资源的引用的步骤。

18. 根据权利要求14所述的远程会议支持方法，其特征在于，所述管理工作空间的利用的步骤包括：切换工作空间的步骤；开始子工作空间的步骤；和结束工作空间的步骤。

19. 根据权利要求14所述的远程会议支持方法，其特征在于，在所述管理工作空间的利用的步骤中，在切换工作空间的步骤及/或开始子工作空间的步骤中，停止原来的工作空间。

20. 根据权利要求14所述的远程会议支持方法，其特征在于，在所述管理工作空间的利用的步骤中，在客户开始会话时，指示已经开始该会话的其他所有客户连接该客户。

21. 根据权利要求14～20中任一项所述的远程会议支持方法，其特征在于，在所述打开工作空间的步骤中，根据由会议系统发送的用户识别信息来选择工作空间。

22. 根据权利要求14～20中任一项所述的远程会议支持方法，其特征在于，在所述打开工作空间的步骤中，根据会议系统利用IC卡发送的用户识别信息来选择工作空间。

23. 根据权利要求14～22中任一项所述的远程会议支持方法，其特征在于，在所述打开工作空间的步骤中，根据用于确定由会议系统发送的工作空间的信息来选择工作空间。

24. 根据权利要求14～22中任一项所述的远程会议支持方法，其特征在于，在所述打开工作空间的步骤中，根据用于确定会议系统基于保持在IC卡中的信息而发送的工作空间的信息来选择工作空间。

25. 一种以计算机可读形式记载的计算机程序，使在计算机系统上执行用于支持实现多个会议系统间的协作的处理，其特征在于，具有：

提供由一个或一个以上会话构成的工作空间的步骤；

响应用户对工作空间的选择，打开工作空间的步骤；

把已打开的工作空间追加到活动工作空间的步骤；和

管理工作空间的利用的步骤。

远程会议系统和远程会议支持方法以及计算机程序

技术领域

本发明涉及一种通过网络实现多人协同工作的远程会议系统和远程会议支持方法以及计算机程序，特别涉及一种通过连接多个站点来实现远程协同工作的远程会议系统和远程会议支持方法以及计算机程序。

具体而言，本发明涉及一种提供共享工作空间的远程会议系统和远程会议支持方法以及计算机程序，该共享工作空间用于使参加者容易和其他的会议参加者进行会议系统之间的连接或进行信息共享，特别涉及一种在利用了多媒体的多个会议系统装置中，顺利实现各个会议参加者对发表用资料文件等信息的共享的远程会议系统和远程会议支持方法以及计算机程序。

背景技术

专利文献1： 特开平8-251568号公报

专利文献2： 特开平8-70300号公报

专利文献3： 特开2002-41429号公报

最近，对用于将各个计算机相互连接的网络计算技术的需求日益高涨。在网络连接环境下，可以顺利地进行计算机资源的共享和信息共享、流通、分发、交换等协同工作。

例如，通过网络来实现多人的协同工作的系统有电视会议系统。采用电视会议系统，在位于相互远离的地点的会议室之间传图像和声音，可以看到映在电视画面上的参加者的面孔来召开会议。实际上彼此位于远程地区的参加者可以如同在同一会议室开会那样讨论事宜。另外，由于各个参加者不需要移动，所以能够有效利用时间和削减差旅费等经费等。

电视会议系统一般由摄像机、话筒、监视器、扬声器等图像和声音的输入输出装置、图像和声音的编码及解码装置、连接各个地点的通信装置以及线路构成。另外，为了在远程的会议室之间共享数据，双方准备电子黑板相互进行书写或共享应用程序进行操作。

最近，伴随因特网的一直连接和以xDSL及CATV为首的高速通信的普及，采用以电视会议为首的双向通信的远程地区间的协同工作系统的使用越来越多。

但是，使用电视会议系统等在多个场所召开远程会议时，需要做以下事情。

（1）将设在各站点的系统相互连接，发布在各站点收录的图像和声音。

（2）共享会议中所需的资料。

以往的电视会议系统中，为了将系统相互连接，会议的参加者需要办理以下手续。

（1）1对1连接时，向设在站点的装置输入连接方的姓名和地址，进行调用（呼び出す）来进行连接。

（2）将3个或3个站点以上相互连接时，在被称为多地点连接装置的装置中登记各站点的系统地址，通过从多地点连接装置调用各站点来进行连接。

以往的远程会议等系统使用电话线路等的线路交换系统的通信线路将系统之间连接起来，所以系统彼此连接的基本形式是1对1连接。

多地点连接装置是为了连接3个或3个以上的这种系统而设计的，通过连接多地点连接装置和设在各站点的站点装置，构成星型连接。多地点连接装置具有手动选择发布给各站点的站点图像，或通过输入声音来选择要发布的图像的功能。以往的多地点连接装置主要用于连接3个或3个以上站点来召开远程会议等场合，它被定位在通过线路交换来实现所有站点的连接的星型连接的中心（集线器：hub）（参照图56）。

例如，利用多媒体的通信会议系统中，为了使不习惯会议系统的步骤的参加者也能容易地利用系统，提供具有模拟实际会议室的会议桌、

会议座位、电话机等图标的图形用户界面，通过使用电话机图标，可以对其他会议参加者进行利用多媒体的呼叫设定（例如，参照专利文献1）。

另一方面，作为今后的计算机和网络的目标方向，提倡“泛在（ubiquitous）”。例如，希望能够无论何时何地都能获取所有知识。

词“泛在”或“泛在计算”是美国Xerox公司的PaloAlto研究所的已故Mark Weiser先生开始倡导的，意思是指“无论使用者在任何地方都可以利用相同性能计算机的能力的环境”。所谓“计算”，是指不论访问信息时是否持有PC（Personal Computer）和PDA（Personal Digital Assistant）等计算机设备，与日常的工作空间成为一体地导入计算机，在用户意识不到的状态下提供信息收集和管理、信息分析和其他运算处理、信息显示、信息分发等计算机能力。

通过将这种泛在技术应用于远程会议系统，计算机文件等格式化信息当然没问题，即使各种默认的知识，也可以实现工作空间灵活性高、跨越了办公室、企业、国籍等框架的合作，扩大了业务的可行性。

例如，关于文件共享，提出了一种在临时构成的网络上，各个计算机之间可以共享各移动型计算机具有的文件的网络系统（例如，参照专利文献2）。此时，移动型计算机之间的消息通信是通过指定发送方地址和接收方地址，并对网络上的固定地址和与网络连接的移动型计算机的地址进行地址转换来实现的。但是，需要事先决定将地址转换机和移动型计算机相互连接的机构以及可否共享文件。共享文件时需要事先进行有意识的手续，而且不能共享未格式化的信息。

另外，还提出了一种会议系统，其可以容易地进行会议用共享资料等的准备和保管（例如，参照专利文献3）。此时，通过因特网接入网站提供TV电话会议服务，会议参加者使用通信终端，通过因特网接入网站，使用共享资料召开实时会议。但是，需要事先在会议参加者的终端设备上下载应用程序。

发明内容

本发明的目的在于，提供一种良好的远程会议系统和远程会议支持方法以及计算机程序，其可以连接多个站点并实现远程协同工作。

本发明的另一目的在于，提供一种良好的远程会议系统和远程会议支持方法以及计算机程序，其可以提供参加者容易和其他的会议参加者进行会议系统间的连接或信息共享的共享工作空间。

本发明的另一目的在于，提供一种良好的远程会议系统和远程会议支持方法以及计算机程序，其可以实现来自利用多媒体的多个会议系统装置的协作呼叫设定及信息共享。

本发明的另一目的在于，提供一种良好的远程会议系统和远程会议支持方法以及计算机程序，其可以根据简单的用户操作来顺利地进行会议中使用的信息的收集、管理、分析、显示、分发等操作。

本发明是鉴于上述问题而提出的，本发明的第1方面是支持实现多个会议系统间的协作的远程会议系统，其特征在于，具有：

设置在各个站点、用于运行各个会议系统的站点系统；和

共享工作空间服务器，其将各个站点系统相互连接，使各个站点之间共享工作空间，该工作空间为用于管理或利用作为协作单位的任务的对象。

其中，所述共享工作空间服务器用于管理以下内容：管理所述站点之间的连接的会话、会议中使用或作为会议记录而生成的文件、对会议相关资源的引用（reference）信息、会议参加者进行的对文件等的访问的历史信息。

因此，根据本发明的第1方面涉及的远程会议系统，会议的参加者通过操作由共享工作空间提供的图形用户界面，不必知道各个多媒体通信会议系统的调用地址，就能连接多媒体通信会议系统，可以很容易地从会议系统访问会议相关文件等信息。

所述共享工作空间服务器提供用于进行会话连接、对文件及/或资源的引用的用户界面。

另外，所述共享工作空间服务器在客户开始会话时，指示已经开始该会话的其他所有客户连接该客户。

所述站点系统相当于分别独立动作的会议系统，按站点管理会议。各个站点系统具有：电子黑板，其用于提供由共享工作空间提供的图形用户界面；图像声音服务器，其对图像及声音进行编码及解码，与其他站点系统之间进行接收发送，使各个站点共享参加者的动作举止等；认证装置，其用于认证会议的参加者；和站点服务器，其用于管理以下内容：站点系统中的会话、会议中使用或作为会议记录而生成的文件、对会议相关资源的引用信息、会议参加者进行的对文件等的访问的历史信息。

站点系统提供用于实现参加会议的用户之间的合作的界面，进行展示（presentation）控制。展示控制的构成方法各种各样。例如，可以把显示器和键盘及鼠标、图形输入板等普通计算机的用户界面直接设置在会议室。或者，通过利用投影仪投影到墙壁上的投影画面、捕捉用户对该投影画面的操作的摄像机和白板的组合来构成用户界面。另外，在壁面上设置打印、显示、一览显示共享文档等应用程序操作用按钮。当然也可以在会议室内设置用于在用户意识不到的状态下检测用户命令的探测器。

只要构成展示控制，在访问信息时，就不再询问参加会议的用户是否持有PC和PDA等计算机设备。即，计算机以浑然一体的形式被导入工作空间，可以在用户意识不到的状态下提供信息的收集和管理、信息分析和其他运算处理、信息显示、信息分发等计算机能力。计算机文件等格式化的信息当然没问题，即使各种默认的知识，也可以实现工作空间灵活性高、跨越了办公室、企业、国籍等框架的合作，扩大了业务的可行性。

另外，本发明的第2方面是支持实现多个会议系统间的协作的远程会议支持方法，其特征在于，具有：

提供由一个或一个以上会话构成的工作空间的步骤；

响应用户对工作空间的选择，打开工作空间的步骤；

把已打开的工作空间追加到活动工作空间的步骤；和

管理工作空间的利用的步骤。

根据本发明的第2方面的远程会议支持方法，会议的参加者通过操作由共享工作空间提供的图形用户界面，不必知道各个多媒体通信会议系统的调用地址，就能进行多媒体通信会议系统的连接，可以很容易地从会议系统访问会议相关文件等信息。

本发明的第2方面的远程会议支持方法还可以具有：提供显示用于用户进行工作空间选择操作的候补工作空间的用户界面的步骤。

所述管理工作空间的利用的步骤也可以包括：提供用于对文件及/或资源进行引用的用户界面的步骤。

所述管理工作空间的利用的步骤也可以包括：登记对文件及/或资源的引用的步骤。

所述管理工作空间的利用的步骤也可以包括：切换工作空间的步骤；开始子工作空间的步骤；和结束工作空间的步骤。

在所述管理工作空间的利用的步骤，也可以在切换工作空间的步骤及/或开始子工作空间的步骤停止原来的工作空间。

在所述管理工作空间的利用的步骤，也可以在客户开始会话时，指示已经开始该会话的其他所有客户连接该客户。

另外，本发明的第3方面是以计算机可读形式记载的计算机程序，使在计算机系统上执行用于支持实现多个会议系统间的协作的处理，其特征在于，具有：

提供由一个或一个以上会话构成的工作空间的步骤；

响应用户对工作空间的选择，打开工作空间的步骤；

把已打开的工作空间追加到活动工作空间的步骤；和

管理工作空间的利用的步骤。本发明的第3方面涉及的计算机程序定义了用计算机可读形式记载的计算机程序，以便在计算机系统上执行规定的处理。换言之，通过在计算机系统上安装本发明的第3方面涉及的计算机程序，可以在计算机系统上发挥协作作用，能够获得与本发明的第2方面涉及的远程会议支持方法相同的作用效果。

如上所述，根据本发明可以提供一种良好的远程会议系统和远程会议支持方法以及计算机程序，其可以连接多个站点并实现远程协作。

另外，根据本发明可以提供一种良好的远程会议系统和远程会议支持方法以及计算机程序，其可以提供参加者容易和其他的会议参加者进行会议系统间的连接或信息共享的共享工作空间。

根据本发明可以提供一种良好的远程会议系统和远程会议支持方法以及计算机程序，其可以实现来自利用多媒体的多个会议系统装置的协作的呼叫设定及信息共享。

根据本发明可以提供一种良好的远程会议系统和远程会议支持方法以及计算机程序，其可以根据简单的用户操作来顺利地进行会议中使用的信息的收集和管理、分析、显示、分发等操作。

根据本发明，各个用户不用携带用于存储在会议各过程中作为参照信息所需的文件的设备，就可以在会议中向各参加者提供文件。同样，接收了该文件的参加者也不用携带用于存储文件的设备，就可以把文件带回去。另外，通过由服务器记录文件的交接事实，可以进行以会议状况和环境为关键字的信息检索。

本发明的其他目的、特征和优点，通过基于后述的本发明的实施方式和附图所做的详细说明将会更加明显。

附图说明

图1是本发明的一个实施方式涉及的远程会议系统1的结构的示意图。

图2是用于管理站点系统10的会议（电视会议等）的站点服务器100的功能结构的示意图。

图3是共享工作空间服务器30的功能结构的示意图。

图4是利用超级链接来连接多个共享工作空间的状态的示意图。

图5是表示提醒使用IC卡进行登录的画面显示示例图。

图6是表示以列表形式显示由共享工作空间服务器30发送的工作空间的集合的示例图。

图7是通过把IC卡连接到站点服务器来指示利用结束的示例图。

图8是表示在站点服务器100上以列表形式显示由共享工作空间服务器30发送的工作空间的集合的示例图。

图9是以列表形式显示与两个用户相关的共享工作空间的集合的画面示例图。

图10是表示由共享工作空间（项目Y）保持的文件的引用列表（K～N）的画面显示示例图。

图11是表示起动与在站点上选择的文件相关的应用程序，在站点的电子黑板上显示文件的示例图。

图12是用户使用指示设备和键盘等用户输入装置在电子黑板12（或客户终端）上进行画面输入时的状态的示例图。

图13是在电子黑板12上显示的根据用户指示结束应用程序动作后的结果的示例图。

图14是在电子黑板12上显示的用户通过把IC卡连接到站点服务器100，结束该系统的利用时的画面显示示例图。

图15是表示用户把IC卡连接到站点服务器200并经过认证处理，在电子黑板12上显示的相关的共享工作空间（项目）一览的示例图。

图16是表示用户在B会议室的电子黑板12上选择项目Y，结果显示该项目中包含的文件的引用的一览的示例图。

图17是表示用户在B会议室的电子黑板12上选择文件K，结果在共享工作空间服务器30上起动相关的应用程序，在电子黑板12上进行该图形输出的示例图。

图18是表示用户在B会议室的电子黑板12上支持应用程序的结束，结果显示恢复到项目中包含的文件的引用的列表显示的示例图。

图19是表示用户在B会议室连接IC卡结束工作空间的利用时的状态的示例图。

图20是表示通过把IC卡1连接到站点系统10的站点服务器100，在站点系统10的显示装置上显示与用户相关的共享工作空间列表时的状态的示例图。

图21是表示项目X中包含的文件的引用列表被显示在电子黑板12上的状态的示例图。

图22是表示其他用户把IC卡连接到站点系统20的站点服务器200上，从而在站点系统20的显示装置上显示与该用户相关的共享工作空间的列表的状态的示例图。

图23是表示在各个站点的电子黑板12及22上，输出从其他站点的图像声音服务器接收的图像及声音数据的状态的示例图。

图24是表示在各个站点的电子黑板12及22上，显示输出从共享工作空间服务器30接收的画面显示信息的状态的示例图。

图25是表示各个站点的用户通过电子黑板进行输入和利用图像声音服务器进行多媒体信息交换来召开会议的状态的示例图。

图26是表示各个站点的用户通过电子黑板进行输入和利用图像声音服务器进行多媒体信息交换来召开会议的状态的示例图。

图27是表示各个站点的用户通过电子黑板进行输入和利用图像声音服务器进行多媒体信息交换来召开会议的状态的示例图。

图28是表示各个站点的用户通过电子黑板进行输入和利用图像声音服务器进行多媒体信息交换来召开会议的状态的示例图。

图29是表示根据用户的应用程序结束指示，使A会议室的电子黑板12的显示返回到项目文件列表状态的示例图。

图30是表示根据用户的结束指示，站点服务器200结束会话时的状态的示例图。

图31是表示根据用户的结束指示，站点服务器100结束会话时的状态的示例图。

图32是概略表示整个共享工作空间流程的流程图。

图33是表示用于进行工作空间的利用的处理步骤的流程图。

图34是更详细地表示图33所示的流程图中的工作空间结束处理的步骤的流程图。

图35是更详细地表示图33所示的流程图中的用于登记对象的引用的处理步骤的流程图。

图36是更详细地表示图33所示的流程图中的步骤S15中的开始子工作空间的处理步骤的流程图。

图37是更详细地表示图36所示的流程图中的步骤S42中的工作空间的停止处理的步骤的流程图。

图38是更详细地表示图33所示的流程图中的步骤S14中的切换工作空间的处理步骤的流程图。

图39是更详细地表示图34所示的流程图中的步骤S21中的保存未登记历史的处理步骤的流程图。

图40是表示参照工作空间的处理步骤的流程图。

图41是表示开始会话的处理步骤的流程图。

图42是表示站点系统10的安装示例图。

图43是表示在壁面上设置共享文档的印刷、显示、一览显示等应用程序操作用按钮的示例图。

图44是表示本发明的一个实施方式涉及的会议室的概观图。

图45是表示在本发明涉及的会议室中被放大的用户界面画面的构成示例图。

图46是表示两个用户把自己的IC卡对准设在会议桌上的IC卡识别单元1003的读取面时的状态的示例图。

图47是表示一个用户进行多个文件显示时的文件分发处理步骤的流程图。

图48是表示多个用户进行多个文件显示时的文件分发处理步骤的流程图。

图49是表示在远程站点系统之间确立会话的步骤的说明图。

图50是表示在会话中参照文件的动作示例图。

图51是表示在会话中参照文件的动作示例图。

图52是表示在会话中参照文件的动作示例图。

图53是表示在会话中参照文件的动作示例图。

图54是表示在会话中参照文件的动作示例图。

图55是表示由元数据管理器1005管理的元数据模式结构的示意图。

图56是表示利用了用于实现3个或3个以上地点的站点连接的多地点连接装置的系统结构（现有技术）的示意图。

具体实施方式

以下，参照附图详细说明本发明的实施方式。

A. 远程会议系统的结构

图1表示本发明的一个实施方式涉及的远程会议系统1的结构示意图。如该图所示，远程会议系统1的结构是两个站点系统10及20通过共享工作空间服务器30而相互连接的结构。在该图所示的示例中，为了简化附图，描绘的是共享工作空间服务器30连接两个站点（即会议系统），但并不限定于1对1的连接，希望理解为可以将3个或3个以上地点的站点相互连接。

共享工作空间服务器30不同于使用电话线路等线路交换系统的通信线路并定位在星型连接的中心的多地点连接装置。如后面所述，共享工作空间服务器30用于管理以下内容：管理会议系统间的连接的会话；会议中使用或作为会议记录生成的文件；对会议相关资源的引用信息；由会议参加者进行的对文件的访问的历史信息。

站点系统10及20相当于分别独立动作的会议系统，在各个站点召开会议。这些站点系统能够以现有的电视会议系统为基础来构成。例如，装备图像声音服务器11及21，输入输出摄像机、话筒、监视器、扬声器等的图像和声音，进行图像及声音的编码和解码，与其他站点系统之间进行接收发送，在各个站点共享参加者的动作和举止等。

双方准备电子黑板12和22，在各个站点进行书写，或在各个站点系统之间共享应用程序进行操作。本实施方式在电子黑板12和22上示出由共享工作空间提供的图形用户界面（GUI），会议参加者通过操作该界面，可以进行与多媒体通信会议系统的连接，或访问与会议相关的文件等信息（后述）。

各个站点的会议参加者为本远程会议系统1的用户。会议参加者通过操作由共享工作空间提供的图形用户界面，可以不必知道各个多媒体通

信会议系统的调用地址，就能进行多媒体通信会议系统的连接，容易从会议系统访问与会议相关的文件等信息。

在各个站点系统10及20中装备有用于认证会议参加者的认证装置。在本实施方式中，各参加者携带IC卡作为个人认证介质，站点系统10及20中装备有访问IC卡的卡读取装置13及23，可以进行认证处理和权限确认等。

在图1所示的共享工作空间型远程会议系统1中，可以实现以下事项，支持远程地区间的协同工作。

（1） 马上连接协作对方。

（2） 马上获取协作所需的文档。

（3） 把协作结果马上用于下一程序。

本实施方式涉及的远程会议系统1对各个站点提供协同工作所需的模态（modality）和模态的组合。例如，可以把声音、展示资料等文件、电子黑板、面孔图像的发布和远程协作编辑作成数据包进行利用。

远程会议系统1通过进行与协同工作相关的文档提供和与协同工作参加成员的自动连接，使进行协同工作的空间分别适应于各组的工作（站点）。

远程会议系统1进行实时协作和非实时协作的结合。即，记录实时协作（例如，保存电子黑板和所使用的展示资料）而使其与非实时协作结合，或将文档与实时协作关联而与非实时协作结合。

以下表示本实施方式涉及的共享工作空间型远程会议系统1的概略动作步骤。

（1）用户利用会议系统时，选择共享工作空间（登录或带确认地访问工作空间）。

例如，使用与共享工作空间1对1对应的IC卡，向系统输入ID。或者，进行个人登录，利用GUI操作来选择工作空间。

（2）通过打开共享工作空间，确认现在谁在共享工作空间或谁在会议系统中正在通信。

（3）在共享工作空间内选择“会议”，就可以从该站点参加远程会议（可以在共享工作空间中召开全体会议和确定个人的会议等多个会议）。

（4）可以事先在共享工作空间中放置文档，在会议中参照文件或保存会议中电子黑板上的图像。

（5）共享工作空间被分层，通过超级链接进行相互连接。

（6）可以在参加共享工作空间的同时参照子工作空间。

（7）操作子工作空间，在共享工作空间中公开信息（从个人工作空间进行拖拽）。

用户对自己所处的站点系统10，通过划（かざす）IC卡，经过规定的认证处理，即可以登录系统。登录后，站点系统10提示与该用户相关（有权限）的工作空间一览。此处所说的工作空间相当于一个会议，对相同的站点系统10，其他用户随后划IC卡请求登录时，经过同样的认证处理被允许登录时，提示与在先登录的用户相同的工作空间一览。此时，选择确定的工作空间，即提示与该工作空间有关的共享文档（文件）一览。另一方面，在远程站点系统中，选择相同工作空间时，在这些站点系统之间确立工作空间的连接，进行和本地站点系统相同的动作。并且，保持对工作空间内的共享文档的文件打开、编辑等操作的历史，可以在以后用作检索关键字。在工作空间内的活动没有本地和远程的区别。

图2是用于管理站点系统10中的会议（电视会议等）的站点服务器100的功能结构的示意图。虽然未图示，但希望理解为其他站点系统20中的站点服务器200也具有相同的结构。

站点服务器100具有：在站点执行认证步骤的一部分的认证模块；管理设置在站点的电子黑板和图像声音服务器等构成站点系统的子系统的网络地址等的子系统管理模块；和管理它们的站点服务器管理器。

站点服务器100使用所连接的卡读取装置13，根据从会议参加者持有的IC卡读出的认证信息和权限信息，与共享工作空间服务器30进行通信，实现工作空间的利用。

在各个工作空间中管理以下内容：用于管理站点即会议系统间连接的会话；会议中使用或作为会议记录生成的文件；对与会议相关的资源的引用信息；由会议参加者进行的对文件和资源等的访问的历史信息。

在站点系统10中提供图形用户界面，会议参加者通过使用用户界面指定设在工作空间的同一会话，可以进行协作呼叫设定和信息共享。与会议相关的资源，例如可以存在于该站点系统10内，也可以保管在站点内的其他保管场所或站点外的服务器上，例如以URL（Uniform Resource Locator：资源标识符）形式来记述。访问历史由访问发生的场所、访问用户（人）和访问时间等信息构成。

工作空间内的各个会话、文件、引用信息、访问历史信息都分配有访问控制列表（ACL）。工作空间管理器31除了能够以工作空间为单位管理或限制利用之外，还可以以工作空间内的会话为单位、以文件为单位、以引用信息为单位、或以访问历史信息为单位等以细致的单位来进行访问控制（后述）。

站点服务器100，例如，以在连接网络的个人电脑（PC）和工作站（WS）等普通计算机系统上起动规定的服务器应用程序的形式来实现。

图42表示站点系统10的安装示例。图示的站点系统10由以下部分构成：会议参加者等用户经由信息终端的用户界面（未图示）进行访问用的Web界面1001；管理个人数据的目录服务单元1002；进行用户登录和分发共享文件时的认证处理的IC卡认证单元1003；保管在该站点内的共享文档的文档存储器1004；获取并管理对共享文档的访问历史和登录时用户在站点内进行的其他行动历史的元数据管理器1005；和展示控制器1006。

Web界面1001提供会议参加者等用户经由信息终端的用户界面（未图示）进行访问用的入口。

目录服务单元1002管理该站点内的用户（会议参加者）的个人数据。

IC卡认证单元1003利用由IC卡实现的超近距离通信技术和耐短波性认证技术（公知），进行用户登录和分发共享文档时等的认证处理。

文档文件存储器1004保管会议使用的展示文件等该站点内的共享文档。

元数据管理器1005在工作空间的后台获取对共享文档的访问历史和登录时用户在站点内进行的其他行动历史、以及分发（带回）共享文档等的信息，并作为元数据进行管理。

展示控制器1006提供在会议等工作空间上，用户（即会议参加者）相互之间实现合作所需的界面。展示控制器1006的构成方法各种各样。例如，可以在会议室中直接设置显示器和键盘及鼠标、图形输入板等普通计算机的用户界面。或者，通过利用投影仪投影到墙壁上的投影画面、捕捉用户对该投影画面的操作的摄像机和白板的组合来构成用户界面。另外，在壁面上设置共享文档的打印、显示、一览显示等应用程序操作用按钮（参照图43）。当然也可以在会议室内设置用于在用户意识不到的状态下检测用户命令的探测器。

只要构成展示控制器1006，在访问信息时，就不再询问是否持有PC和PDA等计算机设备。图44表示本发明的一个实施方式涉及的会议室的概观。计算机以浑然一体的形式被导入图示的工作空间，可以在用户意识不到的状态下提供信息的收集和管理、信息分析和其他运算处理、信息显示、信息分发等计算机能力。即，计算机文件等格式化的信息当然没问题，即使各种默认的知识，也可以实现工作空间灵活性高、跨越了办公室、企业、国籍等框架的合作，扩大了业务的可行性。

图55表示元数据管理器1005管理的元数据模式结构的示意图。利用元数据管理器1005按照以下步骤进行用户登录会议（会话）的管理。

（1）用户（会议发表者等）通过把存储有用户ID的IC卡或其他便携认证介质连接到设在会议室中的读卡器等连接终端，进行登录。

（2）展示控制器1006把所提示的用户ID信息发送给已存储有用户属性的目录服务单元1002，获取用于保持用户的信息组的对象的位置信息（服务器的ID及信息组对象的ID对）。

（3）元数据管理器1005使用从展示控制器1006发送的终端信息，记录“终端ID、用户ID、开始利用时间”。

（4）展示控制器1006以服务器ID为基础，经由网络向服务器发送请求，请求与用户对应的会话信息。

（5）展示控制器1006以所发送的会话信息为基础，进行信息组的显示。

（6）发表者通过从信息组选择会话，把房间和会话联系起来。

（7）展示控制器1006以服务器ID为基础经由网络向服务器发送请求，请求与用户对应的信息组（超级文本）。

（8）展示控制器1006以所发送的信息组的超级文本为基础，进行信息组的显示。

（9）用户（发表者）通过从信息组选择文件，驱动对应的应用程序，进行画面显示。

如参照图1所说明的那样，站点系统10和20之间通过共享工作空间服务器30而相互连接。图3表示共享工作空间服务器30的功能结构的示意图。

共享工作空间服务器30是为了在各个站点之间共享用于管理或利用成为协作单位的任务的对象即工作空间而设置的。

工作空间管理器31管理在该远程会议系统1内的各个站点生成的工作空间。

每个工作空间设有访问控制列表（ACL），工作空间管理器31根据从会议参加者持有的IC卡读出的认证信息和权限信息，管理或限制跨越多个站点的工作空间的利用。

在各个工作空间管理以下内容：管理站点即会议系统之间的连接的会话、会议中使用或作为会议记录而生成的文件、对与会议相关的资源的引用信息、由会议参加者进行的对文件和资源等的访问的历史信息。

工作空间内的各个会话、文件、引用信息、访问历史信息都分配有访问控制列表（ACL）。工作空间管理器31除了能够以工作空间为单位管理或限制利用之外，还能以工作空间内的会话为单位、以文件为单位、以引用信息为单位、或以访问历史信息为单位等以细致的单位来进行跨越站点的访问控制。

工作空间服务器30，例如，以在连接网络的个人电脑（PC）和工作站（WS）等普通计算机系统上起动规定的服务器应用程序的形式来实现。

其中，“站点”指物理的场所。与此相对，“工作空间”是假想的信息共享场所。会话是同步工作的单位。在一个站点系统内可以配设多个工作空间，在一个工作空间内管理多个会话（参照图3）。在本说明书中，为了简化说明，把站点系统内的工作空间设为一个。另外，在工作空间内仅确立一个会话的情况下，远程会议、会话、工作空间意思相同。

下面，参照图49说明在远程站点系统之间确立会话的顺序。

在某一站点A，用户一旦经过例如以IC卡为介质的认证手续登录工作空间，则有权限的会话（会议、相当于后述的“项目”）被一览显示在电子黑板或其他显示器上。

在相同站点A，另外有其他用户登录同一工作空间时，一览显示这两个用户共用的会话。一旦选择某一会话，则将其起动，同时显示会话中共用的文件一览。

另外，在其他站点B选择同一会话时，利用共享工作空间服务器确立站点之间的同步状态。结果，不仅在站点内，而且在站点之间也可以实现文件共享，可以进行文件的打开、编辑等同步工作。

也可以在工作空间外确立会话，进行远程会议。

下面，说明工作空间内的文件参照方法。

为了在工作空间内共享文件，基本上各用户需要把共享文件事先登记（保存）在工作空间内。工作空间服务器30利用访问控制列表（ACL）管理事先登记的文件（参照图3）。

图50描述了在会话中参照文件时的动作。

有文件权限的用户通过自己所处的站点服务器100，对工作空间服务器30提出文件参照请求。

工作空间服务器30响应文件参照请求，取出在相关工作空间内事先登记的文件，起动打开该文件的应用程序。

然后，工作空间服务器30对文件参照请求方的站点服务器以及与请求方的站点服务器已确立会话的其他站点服务器，提供针对所起动的应

用程序的输入输出界面。结果，在站点服务器之间共享对文件的打开和编辑等文件操作，实现在远程地区间的协作。

为了在工作空间内共享文件，基本上各用户需要把共享文件事先登记（存储）在工作空间内，但是，当然各个用户也可以共享未事先登记在工作空间内而带入会议的文件。图51表示该情况下的文件参照方法。

有文件权限的用户通过自己所处的站点服务器100，向工作空间服务器30转发文件的同时，提出对该文件的参照请求。

工作空间服务器30响应文件参照请求，把所转发的文件作为临时文件临时登记在工作空间内，起动用于打开该文件的应用程序。

然后，工作空间服务器30对文件参照请求方的站点服务器以及与请求方的站点服务器已确立会话的其他站点服务器，提供针对所起动的应用程序的输入输出界面。结果，在站点服务器之间共享对文件的打开和编辑等文件操作，实现远程地区间的协作。

然后，使用了临时文件的协作一结束，工作空间服务器30从工作空间内删除该文件。

在图50及图51所示的示例中，通过工作空间服务器30实现文件的共享，所以一旦增大在站点系统之间确立的会话个数和协同工作个数（即起动应用程序数），则导致工作空间服务器30的处理负荷过大。因此，也可以在文件参照请求方的站点服务器中进行应用程序的起动，以做到分散系统的整体负荷。图52表示该情况下的文件参照方法。

有文件权限的用户通过自己所处的站点服务器100，向工作空间服务器30提出对该文件的参照请求。参照请求的文件可以事先登记在工作空间，也可以不事先登记。在前一种情况下，从工作空间取出事先登记的文件，在后一种情况下，从用户的本地盘中取出该文件。

然后，该请求方的站点服务器100从工作空间取出该文件，起动用于打开该文件的应用程序。或者，在请求参照未事先登记的文件时，工作空间服务器可以把该文件作为临时文件进行临时登记。

站点服务器100经由工作空间服务器30对已确立会话的其他站点服务器，提供针对所起动的应用程序的输入输出界面。结果，在站点服务器之间共享对文件的打开和编辑等文件操作，实现远程地区间的协作。

在图52所示的远程协作环境下，即使在参照文件的另一方站点服务器侧，有时在会话中也有想参照其他文件的需求。该情况下时，作为进行参照文件的一个方法，有在已处于应用程序起动中的站点服务器中再次起动应用程序的方法。图53表示该情况下的文件参照方法。

在另一方站点，有文件权限的用户通过自己所处的站点服务器100，向工作空间服务器30转发文件的同时，提出对该文件的参照请求。参照请求的文件可以事先登记在工作空间，也可以不事先登记。在前一种情况下，从工作空间取出事先登记的文件，在后一种情况下，从用户的本地盘中取出该文件。

工作空间服务器30响应文件参照请求，把所转发的文件转发给应用起动中的站点服务器。或者，在请求参照未事先登记的文件时，工作空间服务器把该文件作为临时文件进行临时登记。

接收到文件的站点服务器除了当前起动中的应用程序，还起动用于所接收文件的应用程序，同时对已确立会话的其他站点服务器，提供针对所起动的应用程序的输入输出界面。结果，在站点服务器之间共享对新文件的打开和编辑等文件操作，实现远程地区间的协作。

在远程协作环境下，作为参照文件的另一方站点服务器侧想参照其他文件时进行文件参照的其他方法，还有另一方站点服务器亲自起动应用程序的方法。图54表示这种情况下的文件参照方法。

在另一方的站点系统中，通过自己所处的站点服务器100，向工作空间服务器30提出对该文件的参照请求。参照请求的文件可以事先登记在工作空间，也可以不事先登记。在前一种情况下，从工作空间取出事先登记的文件，在后一种情况下，从用户的本地盘中取出该文件。

然后，该请求方的站点服务器100从工作空间取出该文件，起动用于打开该文件的应用程序。或者，在请求参照未事先登记的文件时，工作空间服务器把该文件作为临时文件进行临时登记。

站点服务器100经由工作空间服务器30，对已确立会话的其他站点服务器，提供针对所起动的应用程序的输入输出界面。结果，在站点服务器之间共享对新文件的打开和编辑等文件操作，实现远程地区间使用多个文件的协作。

B. 在远程会议系统上的动作

在前项A说明了本实施方式涉及的远程会议系统的结构，在本项将详细说明在远程会议系统上进行的动作示例。

B—1. 动作示例1

（1）用户把IC卡对准（かざす）在站点系统10内准备的卡读取装置，连接到站点服务器100，进行认证。

（2）IC卡上保持着对用户使用的共享工作空间服务器30的引用。站点服务器11以该引用为基础，进行与共享工作空间服务器30的连接。或者，在IC卡上仅保持用户名，设置全球性目录服务器（未图示），在目录服务器上进行与各个用户有关的信息管理。也可以在目录服务器中保持与用户对应的用户共享工作空间服务器的引用。

（3）站点服务器100使用IC卡对共享工作空间服务器30进行认证，并进行登录。作为认证方式，可以读出记录在IC卡上的信息，来进行对共享工作空间服务器30的认证，也可以使IC卡计算对共享工作空间服务器30进行的基于公开密钥加密系统的认证协议的一部分消息。

（4）共享工作空间服务器30根据所认证的用户信息，把希望的共享工作空间作为响应返回。共享工作空间服务器30以所指定的共享工作空间的信息为基础，抽出构成共享工作空间的GUI所需的必要信息，转发给站点系统10。此时，共享工作空间服务器30除了用户信息以外，为了选择对用户而言合适的初始共享工作空间，也可以利用以下所示的一部分或全部信息来附加优先顺序。

- 站点服务器100的网络地址和主机名等网络信息
- 将站点服务器100设在何处的位置信息
- 从站点服务器100接收的共享工作空间名、文件名、URL等信息
- 用户的日程信息和当前时间

- 是否和某个用户在一起
- 过去曾利用过哪些共享工作空间

图4表示通过超级链接连接多个共享工作空间的状态的示意图。

共享工作空间服务器30选择初始的共享工作空间时，可以对所有的共享工作空间附加优先顺序，也可以仅对用户利用书签等事先指定的共享工作空间的部分集合附加优先顺序。

另外，提供多个共享工作空间，让用户从中选择一个时，可以使用以下所示的任一方式或其一部分或全部。

- 使用通常的超级文本中的导航形式
- 使用菜单
- 显示由共享工作空间构成的图形结构的一部分或全部

（5）用户沿着由共享工作空间服务器30提供的多个工作空间构成的图形结构，通过根据需要选择节点来移动、选择希望的共享工作空间。此时，显示多个工作空间时，可以根据前述的优先顺序来改变颜色、大小、形状、位置或其组合，从而帮助用户进行选择。在默认的共享工作空间是用户希望的共享工作空间时，也可以省略该选择步骤。

（6）在站点系统10的电子黑板12上显示共享工作空间1的GUI。

（7）这里，站点系统10的用户1选择所显示的共享工作空间内的多个会话中的一个会话。当然，存在于共享工作空间内的会话也可以是一个。通过该步骤，有关站点系统10的信息被登记在会话1中。

（8）站点系统20的用户2进行和上述相同的操作。通过该步骤，有关站点系统20的信息被登记在会话1中。

（9）共享工作空间服务器30检测到已追加了指定同一会话的站点系统时，就对已登录的所有站点系统发出与其他站点系统连接的请求。结果，可以马上连接协作对方。此时，多个站点系统之间的连接形式也可以使用以下任一形式。

- 集线器型
- 完全图型
- 扩展树型

（10）用户2通过选择与用户1相同的会话1，即开始共享各个站点系统10及20的电子黑板12及22的画面。用户1及用户2通过各个电子黑板12及22，可以访问展示资料等会议所需文件。即，可以马上取出协作所需的文档。

（11）画面共享是用钩子程序（hook）拦截应用程序的输入输出而进行的。

（12）可以配备下述功能的机构：即在进行画面共享时，对来自多个网站的输入请求，通过任何网站的输入来改变字符和线的颜色。

（13）通过画面共享而驱动的应用程序所生成的文件和资源的引用历史被保存在共享工作空间1（参照图3）中。

如上所述，用户通过把存储有用户ID和其他认证信息的IC卡连接到与会议室相连接的IC卡识别装置1003，可以登录到系统。

用户完成登录时，展示控制器1006把经由IC卡所提示的用户ID信息发送给存储有用户属性的目录服务单元1002，获取用于保持用户的信息组的对象的位置信息（服务器的ID及信息组对象的ID对）。

元数据管理器1005使用从展示控制器1006发送的终端信息，将终端ID、用户ID、开始利用时间进行对应记录。

展示控制器1006以服务器ID为基础，经由网络对服务器发送请求，请求与用户相对应的信息组（超级文本）。然后，以所返回的信息组的超级文本为基础，进行信息组的显示。

用户通过从信息组选择文件，起动对应的应用程序，进行画面显示。

在本实施方式涉及的远程会议系统中，事先登记通过电子黑板进行的文件的生成和参照、资源的引用等会话中的用户的活动历史，从而可以在以后参照历史，把协作结果马上用于下一程序。即，可以进行实时协作和非实施协作的结合。

下面，说明对文件和资源的引用的历史的登记过程及参照过程。

将历史登记到Recently Used中的过程：

- 在网络上有提供多个工作空间的计算机。
- 各个用户在电子黑板或其他客户终端上选择（多个）工作空间。

● 各个用户进行文件的打开和Web（或其他广域信息检索系统）上的信息检索和浏览。

● 把与所打开的文件和浏览信息的Web页有关的引用（URL）存储在用户的客户终端上。

● 从存储在用户的客户终端上的引用中选择需要登记到工作空间的引用。

● 把所选择的引用转发给所有工作空间（或所选择的工作空间）。工作空间登记所接收的引用。

参照Recently Used的过程：

● 各个用户在电子黑板或客户终端上选择（多个）工作空间。

● 各个用户在电子黑板或客户终端上进行查看工作空间的历史的操作。

● 在电子黑板或客户终端的画面上，示出按“日期顺序”、“引用计数顺序”或“重要度顺序”等所排序的工作空间列表。

● 此时，以“个别”、“结合”或“内部会话”形式显示多个工作空间的历史。

● 各个用户通过从列表中选择引用，可以进行文件的打开和Web的浏览。

B—2.动作示例2

在以下说明的动作示例2中，在一个站点中，利用用户持有的IC卡进行认证，进行相关的共享工作空间的列表显示，利用IC卡进行退出。

（1）在站点系统10及站点系统20中，作为电子黑板12及22（或用户的客户终端）上的初始画面，显示提醒使用IC卡的登录画面（参照图5）。

（2）处于站点系统10的用户把IC卡连接到与站点服务器100相连接的卡读取装置13，开始认证。

（3）IC卡上保持着用户使用的共享工作空间服务器30的引用。站点服务器100以该引用为基础进行与共享工作空间服务器30的连接。或者，也可以在IC卡上仅保持用户名，设置全球性目录服务器（未图示），在

目录服务器上进行各个用户的相关信息的管理。此时，在目录服务器中保持与用户对应的用户共享工作空间服务器的引用。

（4）站点服务器10使用IC卡对利用IC卡指定的共享工作空间服务器30进行认证，登录到工作空间。作为认证方式，可以读出记录在卡上的信息，来对共享工作空间服务器30进行认证，也可以使IC卡计算对共享工作空间服务器30进行的基于公开密钥加密系统的认证协议的一部分消息。

（5）共享工作空间服务器30根据使用IC卡所认证的用户信息，检索与该用户相关的共享工作空间的集合。把该检索结果列表发送给站点服务器10。

（6）站点服务器10显示由共享工作空间服务器30发送的工作空间的集合（画面中的工作空间记述为项目）。图6表示以列表形式显示由共享工作空间服务器30发送的工作空间的集合的示例。在该图所示的示例中，一览显示用户之一即渡边先生使用IC卡所认证的结果得到的多个项目（工作空间）。

（7）用户为了结束本系统的利用，可以使用在电子黑板或客户终端上准备的GUI指示结束。或者，可以把IC卡连接到站点系统来指示结束。图7表示通过把IC卡连接到站点服务器来指示利用结束的示例。

B－3.动作示例3

下面，说明在同一站点系统上连接多个IC卡，显示与多个用户相关的共享工作空间，指定保持在共享工作空间内的文件或文件的引用来起动应用程序时的动作示例。

（1）在站点系统10及站点系统20中，作为电子黑板12及22（或用户的客户终端）上的初始画面，显示提醒使用IC卡的登录画面（参照图5）。

（2）用户把IC卡2连接到站点系统10的站点服务器100，开始认证。

（3）IC卡2上保持着用户使用的共享工作空间服务器30的引用。站点服务器100以该引用为基础进行与共享工作空间服务器30的连接。或者，也可以在IC卡2上仅保持用户名，设置全球性目录服务器（未图示），

在目录服务器上进行各个用户的相关信息的管理。此时，在目录服务器中保持与用户对应的用户共享工作空间服务器的引用。

（4）站点服务器10使用IC卡2对共享工作空间服务器30进行认证，登录到工作空间。作为认证方式，可以读出记录在卡上的信息，来对共享工作空间服务器30进行认证，也可以使IC卡计算对共享工作空间服务器30进行的基于公开密钥加密系统的认证协议的一部分消息。

（5）共享工作空间服务器30根据所认证的用户信息，检索与该用户相关的共享工作空间的集合。把该检索结果列表发送给站点服务器10。

（6）站点服务器10把由共享工作空间服务器30发送的工作空间的集合显示在动作黑板12（或用户的客户终端）上。在图8中，一览显示着用户之一即堀切先生使用IC卡所认证的结果得到的多个项目（工作空间）。

（7）其他用户把IC卡1连接到站点系统10的站点服务器100，开始认证。

（8）IC卡1上保持着用户使用的共享工作空间服务器30的引用。站点服务器100以该引用为基础进行与共享工作空间服务器30的连接。或者，也可以在IC卡1上仅保持用户名，设置全球性目录服务器（未图示），在目录服务器上进行各个用户的相关信息的管理（同上）。

（9）站点服务器100使用IC卡对共享工作空间服务器30进行认证并登录。

（10）共享工作空间服务器30根据所认证的用户信息，检索与用户相关的共享工作空间的集合，对站点服务器100进行与当前所保持的集合的运算。该运算可以包括和集合、积集合、差集合、补集合及它们的任意组合。在本实施方式中，作为积集合的示例，检索了利用IC卡1所认证的与用户相关的共享工作空间的以下集合：

- ●项目A
- ●项目Y
- ●项目Z
- ●项目B

与利用IC卡1所认证的与用户相关的共享工作空间的以下集合：

●项目X

●项目Y

●项目Z

●项目W

的积集合：

●项目Y

●项目Z

工作空间的集合信息被从共享工作空间服务器30发送出去。

然后，站点服务器100把所接收的工作空间的集合信息以列表形式显示在动作黑板12或用户的客户终端上。图9表示以列表形式显示与两个用户相关的共享工作空间的集合的画面示例。在该图所示的示例中，显示着通过分别与用户渡边先生和堀切先生相关的共享工作空间的积集合而得到的工作空间的集合。

（11）用户从站点服务器100所显示的列表中选择希望的共享工作空间。响应该选择，站点服务器100发送把所选择的工作空间1的信息发送给共享工作空间服务器30的消息。

（12）共享工作空间服务器30发送共享工作空间1的信息。在此说明了发送保持在共享工作空间中的文件引用列表的示例，但除了文件或文件引用以外，也可以把会话和其他共享工作空间的引用等保持在共享工作空间中（参照图3）。

（13）站点服务器100从共享工作空间服务器30接收文件引用列表，作为共享工作空间1的信息，并在画面上显示该列表。图10表示保持在共享工作空间（项目Y）的文件引用列表（K～N）的画面显示示例。

（14）用户通过显示在电子黑板12或自身的客户终端上的文件引用列表，可以选择希望的文件。假设用户选择文件K，则站点服务器100向共享工作空间服务器30发送表示用户已选择文件K的消息。

（15）共享工作空间服务器30接收到由站点服务器100 发送的包含文件K的引用的消息时，起动与文件K相关联的应用程序。

（16）共享工作空间服务器30把执行所起动的应用程序、捕捉图形等输出作为消息发送给站点服务器100。站点服务器100通过在自身管理的电子黑板12上进行图形输出，实现站点系统10的应用程序的共享。图11表示与在站点中选择的文件相关联的应用被起动，在站点的电子黑板上显示文件的示例。在该图所示的示例中，显示在A会议室中选择的文件K的画面。

（17）用户使用指示设备和键盘等用户输入装置（或在会议室等工作空间上放大的用户界面），在电子黑板12（或客户终端）上进行画面输入。用户所进行的输入，作为输入消息从站点服务器100发送给共享工作空间服务器30，并被转交作为对在共享工作空间服务器30上动作的应用程序的输入。图12表示用户使用指示设备和键盘等用户输入装置在电子黑板12（或客户终端）上进行画面输入时的状态。在该图所示的示例中，在A会议室中，在文件K的显示画面上附加了注解。

（18）用户可以使用上述的用户输入装置在电子黑板12（或客户终端）上对在共享工作空间服务器30动作的应用程序指示结束。响应该结束指示，在共享工作空间服务器30动作的应用程序的动作结束。图13表示在电子黑板12上显示根据用户指示结束应用程序的动作的结果的示例。在该图所示的示例中，在A会议室中，进行与文件K相关的应用程序的结束指示，结果恢复到显示有被保持在共享工作空间（项目Y）中的文件的引用列表的画面。

（19）用户为了结束本会议系统的利用，可以使用电子黑板12（或客户终端）上准备的GUI指示结束，或者可以通过把IC卡连接到站点系统来指示结束。图14表示用户把IC卡连接到站点系统100来结束该系统的利用时的电子黑板12的画面显示示例。

以上说明了从相当于站点系统10的A会议室利用共享工作空间时的情况，当然同样也可以从其他站点访问共享工作空间。

图15表示在相当于站点系统20的B会议室，把IC卡连接到到站点服务器200，经过认证处理，在电子黑板22上显示相关的共享工作空间（项目）一览的示例。

图16表示用户在B会议室的电子黑板22上选择项目Y后，显示该项目中包含的文件引用的一览的示例。

图17表示用户在B会议室的电子黑板22上选择文件K后，在共享工作空间服务器30上起动相关的应用程序，在电子黑板22上进行其图形输出的示例。

图18表示用户在B会议室的电子黑板22上指示结束应用程序后，恢复到项目中包含的文件的引用列表的显示的示例。

图19表示用户在B会议室中连接IC卡来结束工作空间的利用时的状态。

B－4. 动作示例4

下面，说明通过用站点系统10和站点系统20指定同一共享工作空间，连接用于构成各个站点系统的动作黑板12及22，连接用于构成各个站点系统的图像声音服务器11及21的动作示例。

在该动作示例中，在各个共享工作空间中仅管理一个会话，通过使多个站点系统选择同一共享工作空间，将站点系统之间连接，开始会话。

以下虽不详细说明动作步骤，但是也可以不在选择同一共享工作空间的同时将站点系统之间相连接来开始会话，而是通过在选择同一共享工作空间后指示开始会话，从而将站点系统之间相连接并开始会话。

（1）将IC卡1连接到站点系统10的站点服务器100 ，与用户相关联的共享工作空间的列表显示在站点系统10的显示装置（电子黑板12）上（参照图20）。

（2）用户选择显示在电子黑板12上的多个共享工作空间中名称为“项目X”的共享工作空间1。

（3）站点系统10把用户所选择的共享工作空间1的引用发送给共享工作空间服务器30。

（4）共享工作空间服务器30把共享工作空间1保持的文件的引用的列表发送给站点服务器100。另外，共享工作空间服务器30为了可以将选择了共享工作空间1的项目X的站点服务器之间连接，保持站点服务器100的网络地址。

（5）站点服务器100把所发送的文件引用列表显示在电子黑板12上（参照图21）。

（6）其他用户把IC卡2连接到相当于B会议室的站点系统20的站点服务器200，从而与该用户相关联的共享工作空间的列表显示在站点系统20的显示装置（电子黑板22）上（参照图22）。

（7）B会议室的用户选择显示在电子黑板22上的多个共享工作空间中名称为“项目X”的共享工作空间2。

（8）响应该选择操作，共享工作空间服务器30把共享工作空间1保持的文件的引用的列表发送给站点服务器200。另外，共享工作空间服务器30为了可以将选择了共享工作空间1的项目X的站点服务器之间连接，保持站点服务器200的网络地址。

（9）通过上述步骤，选择了同一共享工作空间的站点服务器为两个或两个以上。因此，共享工作空间服务器30对登记的所有站点服务器发出连接其他站点服务器的请求。具体而言，对站点服务器100发出连接站点服务器200的请求，对站点服务器200发出连接站点服务器100的请求。

（10）站点服务器100和站点服务器200在构成两者的服务器16中，发出连接相互的图像声音服务器的请求，同时把电子黑板12及22连接到共享工作空间服务器30，开始共享对应用程序的输入输出。

（11）在本实施方式中，站点服务器100和站点服务器200分别保持图像声音服务器11及21。站点服务器100对图像声音服务器11发出用于从图像声音服务器21接收图像和声音的请求。同样，站点服务器200对图像声音服务器21发出用于从图像声音服务器11接收图像和声音的请求。

（12）图像声音服务器11开始接收来自图像声音服务器21的图像和声音，图像声音服务器21开始接收来自图像声音服务器11的图像和声音。图23表示在各个站点的电子黑板12及22上，输出从另一方站点的图像声音服务器接收的图像及声音数据时的状态。

（13）用户通过站点系统10的电子黑板12提供的图形用户界面，选择文件P。共享工作空间服务器30响应该选择，起动与文件相关的应用程序。

（14）共享工作空间服务器30把执行应用程序的画面显示转发给各个站点系统10及20的电子黑板12及22。

（15）电子黑板12及22均根据由共享工作空间服务器30发送的画面显示信息，进行应用程序画面的显示。图24表示在各个站点的电子黑板12及22上显示输出从共享工作空间服务器30接收的画面显示信息时的状态。

（16）站点系统100和站点系统200的用户，分别使用利用键盘、指示设备等用户输入装置在电子黑板12及22上进行的输入和图像声音服务器11及22，进行信息交换来召开会议。

图25～图28表示各个站点的用户通过电子黑板进行输入和使用图像声音服务器进行多媒体信息的交换，召开会议时的情况。

在图25中，各个站点服务器利用输出显示在电子黑板上的应用程序起动画面和摄像机图像，共享相同的会议环境。

在图26中，A会议室的用户通过电子黑板上的应用程序画面指示文件的特定内容，同时通过声音与B会议室的用户进行洽谈。

在图27中，A会议室的用户利用声音形式接收来自B会议室的用户的回答。

在图28中，A会议室的用户在输出到电子黑板上的应用程序画面上，利用图形用户界面，修改文件的内容。该修改内容被通知给B会议室的站点服务器200，反映在电子黑板22上，同时在共享工作空间服务器30中登记历史。

（17）操作电子黑板12的用户指示结束利用（参照图29），把应用程序所使用的文件存储在共享工作空间1或共享工作空间1上的引用指示的文件服务器（未图示）上。

（18）在站点服务器200中，用户通过连接IC卡2，指示从站点服务器200退出和利用结束。这样，站点服务器200结束会话（参照图30）。

（19）在站点服务器100中，用户通过连接IC卡1，指示从站点服务器100退出和利用结束。这样，站点服务器100结束会话（参照图31）。

B—5. 动作示例5

在以下说明的动作示例5中，作为发表者的用户把作为展示资料的共享文档分发给会议参加者中的其他用户。

在本实施方式涉及的会议室中，例如，准备有投影屏幕等被放大了的用户界面。图45表示该用户界面画面的构成示例。在图示画面上，显示每个参加（登录中）会议的用户的图标。例如，当前发表者的图标是高亮度显示。在该画面上，还备有把展示中使用的共享文档进行“选择分发”、“分发给全体人员”的按钮。以下，说明选择了“选择分发”时的动作步骤。

（1）希望电子分发发表者的信息的参加者把自己的IC卡对准设在会议室中的IC卡识别单元1003，经由IC卡进行连接，表示接受分发的意思。图46表示两个用户把自己的IC卡对准设在会议桌上的IC卡识别单元1003的读取面的状态。

（2）元数据管理器1005管理着用于管理会议室的参加成员的项目，参加者通过划IC卡，向会议室的成员列表中追加用户ID。

（3）各个用户被赋予对拥有的文件目录进行追加的权利。

（4）通过指示分发资料，发表者可以在画面上确认作为当前参加者而登记的用户（参照图45）。

（5）发表者通过支持资料分发的执行，获取登记的用户信息，根据用户信息对保持用户信息组的对象服务器ID和对象ID进行文件上载。

（6）元数据管理器1005把文件的ID、发送者、接收者的列表、时间记录在数据库中。

图47以流程图的形式表示在一个用户进行多个文件显示时，文件的分发处理步骤。

首先，获取文件一览（步骤S101），以分发文件的集合为基础进行文件的选择显示（步骤S102），然后开始分发（步骤S103）。

从会议参加者的集合获取参加者列表（步骤S104）。参加者的集合通过用户登记即把IC卡对准IC卡识别单元1003的读取面这一工作（步骤S107），进行依次追加登记（步骤S108）。

然后，从参加者列表选择分发用户（步骤S105），进行文件分发（步骤S106）。

图48以流程图的形式表示在多个用户进行多个文件显示时，文件的分发处理步骤。

首先，获取文件一览（步骤S111），以分发文件的集合为基础进行文件的选择显示（步骤S112），决定是否分发文件（步骤S113）。

决定进行文件分发时，即开始分发文件（步骤S114）。

从会议参加者的集合获取参加者列表（步骤S115）。参加者的集合通过用户登记即把IC卡对准IC卡识别单元1003的读取面这一工作（参照图46）（步骤S118），进行依次追加登记（步骤S119）。

从参加者列表选择分发用户（步骤S116），进行文件的分发（步骤S117）。

另一方面，决定不开始分发文件时（步骤S113），判别会议是否继续（步骤S120）。在判别为会议继续时，决定分发文件（步骤S121），进行退出。成为分发对象的文件中，除事先登记在工作空间的文件外，也包括用户带入会议中临时登记在工作空间的临时文件。

如图47及图48所示，通过进行文件分发处理，各个用户不必携带用于存储会议各过程中作为参照信息所需的文件的设备，即可在会议中向各个参加者出示文件。同样，接受出示文件的参加者也不必携带用于存储文件的设备，就可以把文件带回去。另外，服务器记录文件的交接事实，由此可以进行以会议状况和环境为关键字的信息检索。

C. 共享工作空间服务器的动作

本实施方式涉及的远程会议系统1的结构是：在多个站点运行着会议系统 ，共享工作空间服务器将这些站点之间相互连接。

共享工作空间服务器30是为了在各个站点间共享工作空间而设置的，该工作空间是用于管理或利用成为协作单位的任务的对象，共享工作空间服务器30用于管理以下内容：用于管理会议系统间的连接的会话；会议中使用或作为会议记录生成的文件；对与会议相关的资源的引用信息；由会议参加者进行的对文件等的访问的历史信息。

会议参加者通过操作由共享工作空间提供的图形用户界面，不必知道各个多媒体通信会议系统的调用地址，就能进行多媒体通信会议系统的连接，可以很容易地从会议系统访问会议相关文件等信息。

以下，说明通过共享工作空间服务器30的介入而实现的共享工作空间流程。

图32概略地表示整个共享工作空间流程。

开始工作空间时，首先，工作空间的候补被显示在站点系统内的电子黑板上（步骤S1）。

通过该工作空间候补显示，用户选择希望的工作空间（步骤S2）。

共享工作空间服务器30响应该选择动作，打开工作空间（步骤S3），追加活动工作空间（步骤S4），进行工作空间的利用（步骤S5）。

图33以流程图形式显示用于进行工作空间的利用的处理步骤。

由用户选择的工作空间被打开，通过电子黑板来进行其中包含的文件或HTTP项目的参照（步骤S11）。

进行文件和HTTP项目的参照时，与其相随，进行对象引用的登记处理（步骤S12）。

伴随着会议的进行，进行新文件的作成，文件的变更，对对象（外部资源等）的引用，这种会议的活动历史被依次保存。然后，通过参照所保存的历史，可以把协作结果马上应用到下一程序。

然后，若被指示结束工作空间的利用，则进行工作空间的结束处理（步骤S13）。

另外，若被指示向其他工作空间切换，则进行工作空间的切换处理（步骤S14）。

若被指示开始其他的工作空间，则开始子工作空间（步骤S15）。

图34更详细地表示图33所示的流程图中的工作空间的结束处理步骤。

首先，进行未登记历史的保存处理（步骤S21）。

然后，从活动工作空间删除正在利用的工作空间（步骤S22），进行工作空间的关闭处理（步骤S23）。

图35更详细地表示图33所示的流程图中的用于登记对象引用的处理步骤。

首先，从活动工作空间的集合中仅取出一个工作空间（步骤S31）。此时，如果工作空间是空的，则结束整个本处理例程。

另一方面，如果存在工作空间，则判别是否追加引用（步骤S32）。

没有要追加的引用时，返回步骤S31，对活动工作空间的集合中的下一工作空间进行处理。

有要追加的引用时，在工作空间中追加参照对象引用（S33），返回步骤S31，对工作空间的集合中的下一工作空间进行处理。

图36更详细地表示图33所示的流程图中的步骤S15中用于开始子工作空间的处理步骤。

首先，判别是否同时利用工作空间（步骤S41）。

进行排他利用时，进行工作空间的停止处理（步骤S42），然后进行工作空间的开始处理（步骤S43）。

进行同时利用时，直接进行工作空间的开始处理（步骤S43）。

图37更详细地表示图36所示的流程图中的步骤S42中的工作空间的停止处理的步骤。

这种情况下，把工作空间从活动工作空间变更为停止工作空间（步骤S51），然后停止该工作空间。

图38更详细地表示图33所示的流程图中的步骤S14中用于切换工作空间的处理步骤。

首先，停止原来的工作空间（步骤S61），工作空间的停止处理按照图37所示的步骤进行。

然后，在电子黑板或其他显示装置上显示工作空间的候补（步骤S62），用户在显示画面上利用图形用户界面选择成为切换对象的工作空间（步骤S63）。

之后，恢复到原来的工作空间（步骤S64）。

图39更详细地表示图34所示的流程图中的步骤S21中用于保存未登记历史的处理步骤。

首先，从未登记历史中仅取出一个对象（步骤S71）。此时，如果历史是空的（步骤S72），则结束整个本处理例程。

另一方面，如果存在未登记的历史时（步骤S72），判别是否追加对象（步骤S73）。在不追加对象时返回步骤S71，进入下一未登记历史的处理。

需要追加对象时，向工作空间追加参照对象引用（步骤S74）。然后，返回步骤S71，进入下一未登记历史的处理。

图40以流程图形式表示用于参照工作空间的处理的步骤。

首先，指定多个工作空间的参照形式（步骤S81）。

然后，根据所指定的参照形式，显示所有活动工作空间共同的对象（步骤S82），或显示所有的活动工作空间的对象（步骤S83）。

图41以流程图形式表示用于开始会话的处理的步骤。

首先，抽出已经开始所指定会话的客户（步骤S91）。

然后，向已经开始会话的所有客户发送连接新客户的指示的消息（步骤S92）。

以上，参照特定的实施方式，详细说明了本发明。但是，本技术领域的普通技术人员在不脱离本发明要旨的范围内可以对该实施方式进行修改和代用，这是不言而喻的。即，本发明是以示例形式进行公开的，不应限定性地解释本说明书的记载内容。为了判断本发明的要旨，应参考权利要求书。

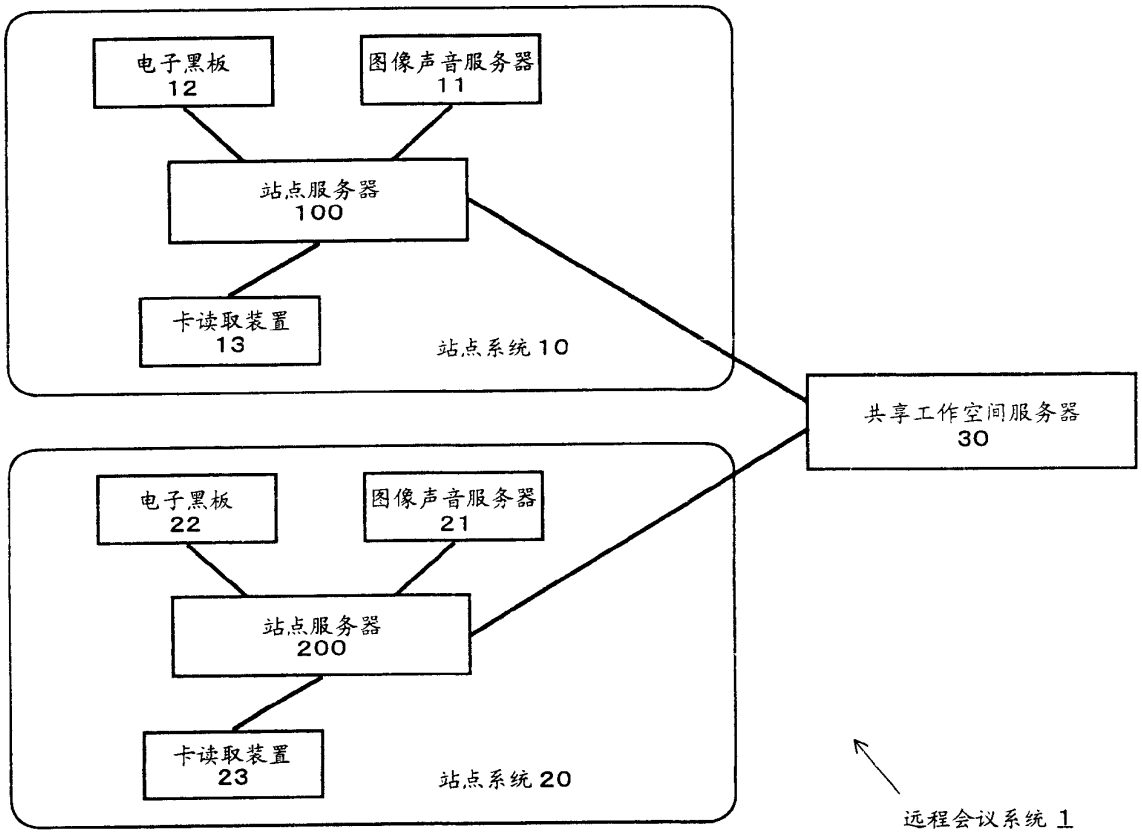

电子黑板
12
图像声音服务器
11
站点服务器
100
卡读取装置
13
站点系统 10
共享工作空间服务器
30
电子黑板
22
图像声音服务器
21
站点服务器
200
卡读取装置
23
站点系统 20
远程会议系统 1

图 1

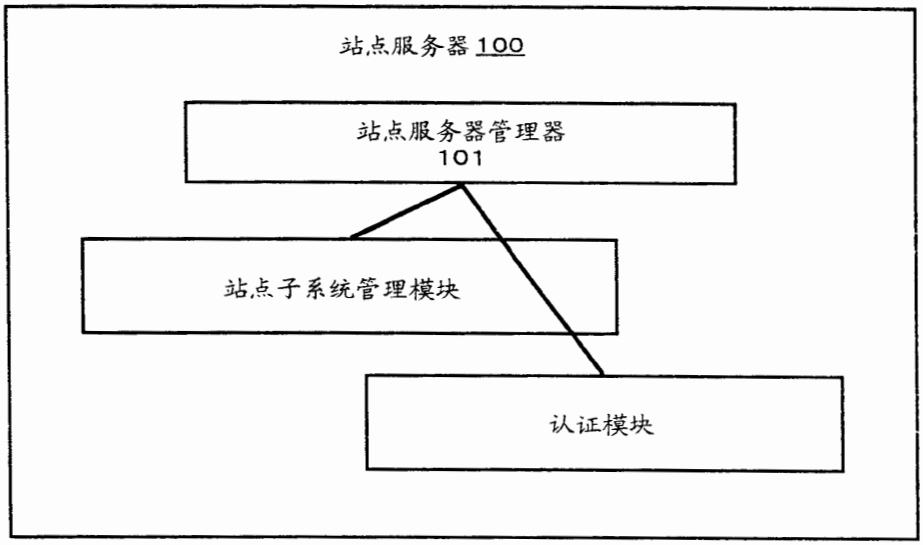


图 2

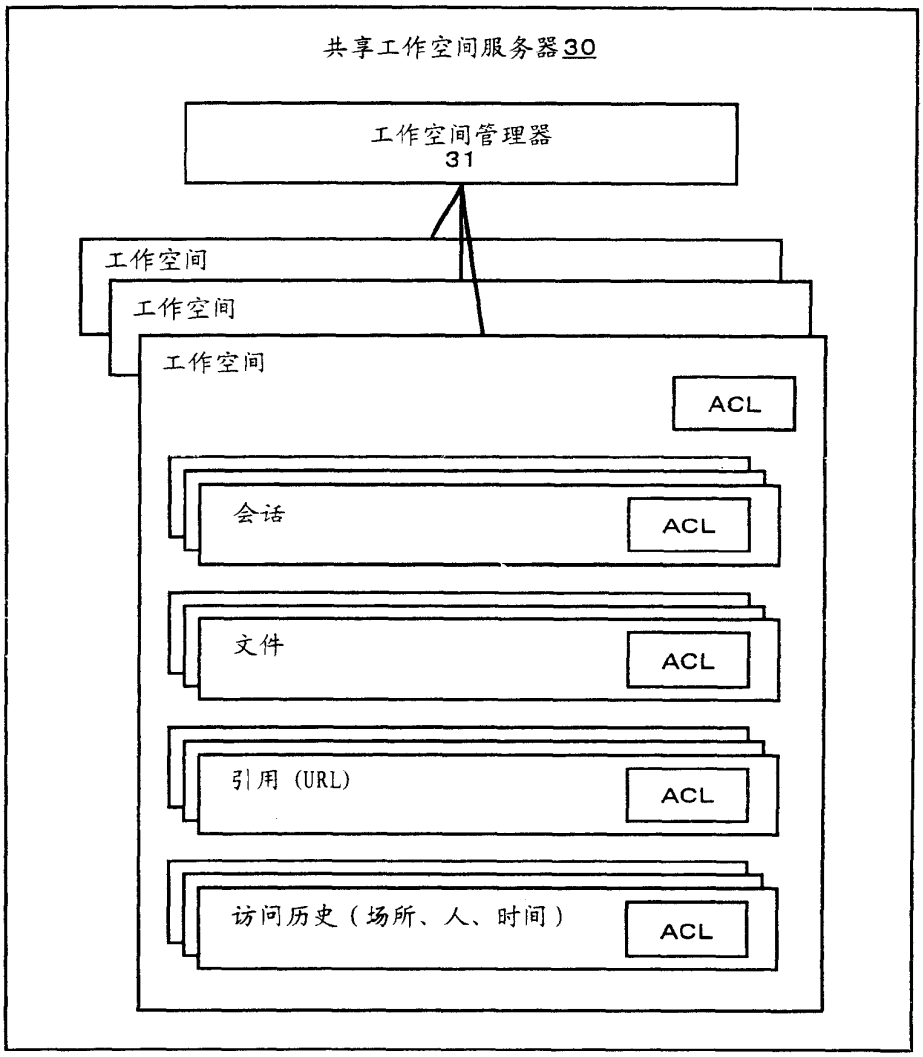

共享工作空间服务器30
工作空间管理器
31
工作空间
工作空间
工作空间
ACL
会话
ACL
文件
ACL
引用 (URL)
ACL
访问历史（场所、人、时间）
ACL

图 3

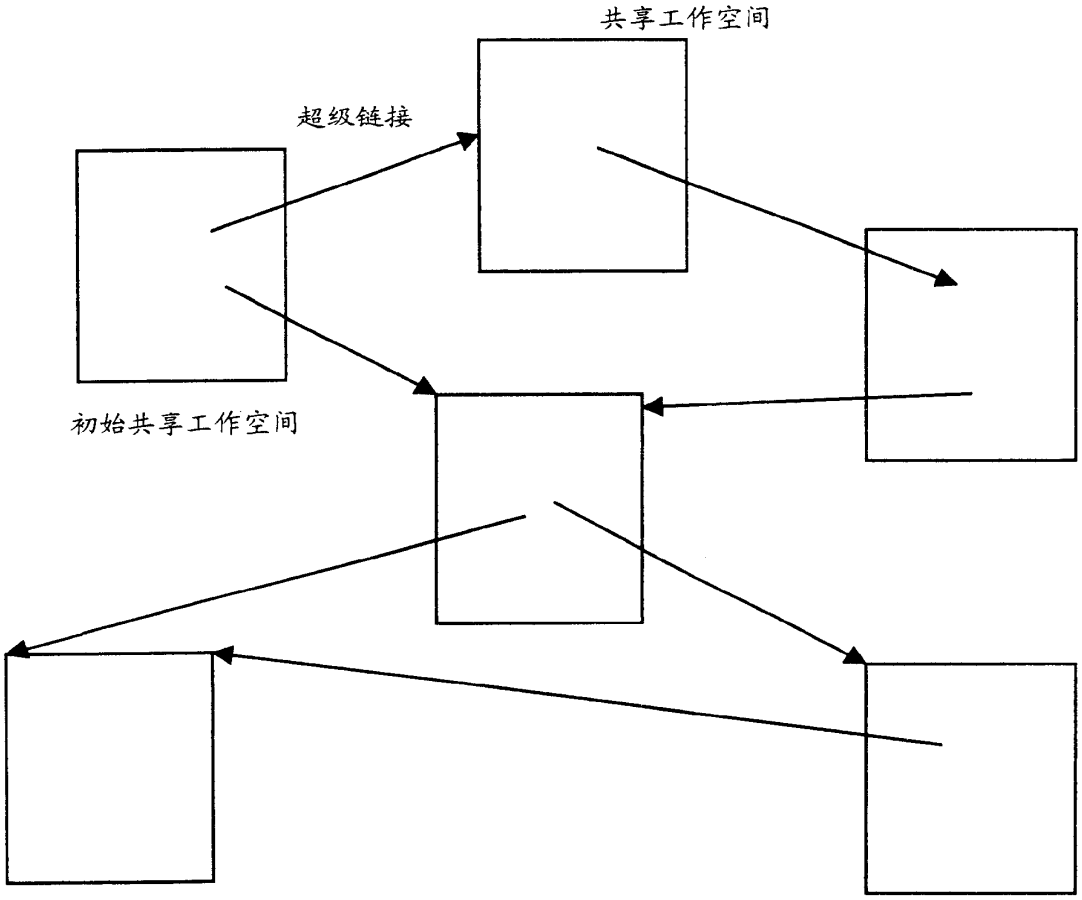


图 4

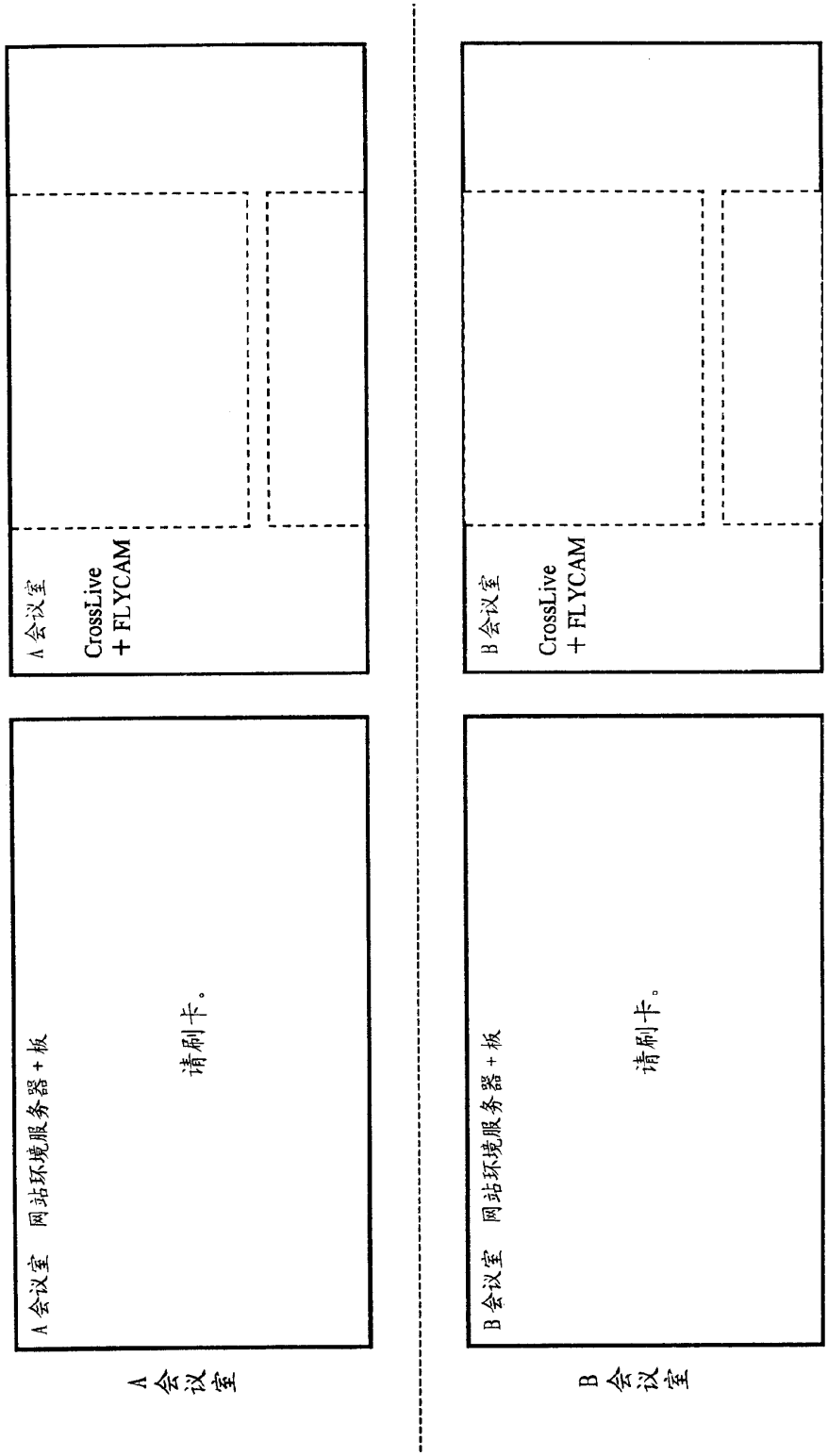


图 5

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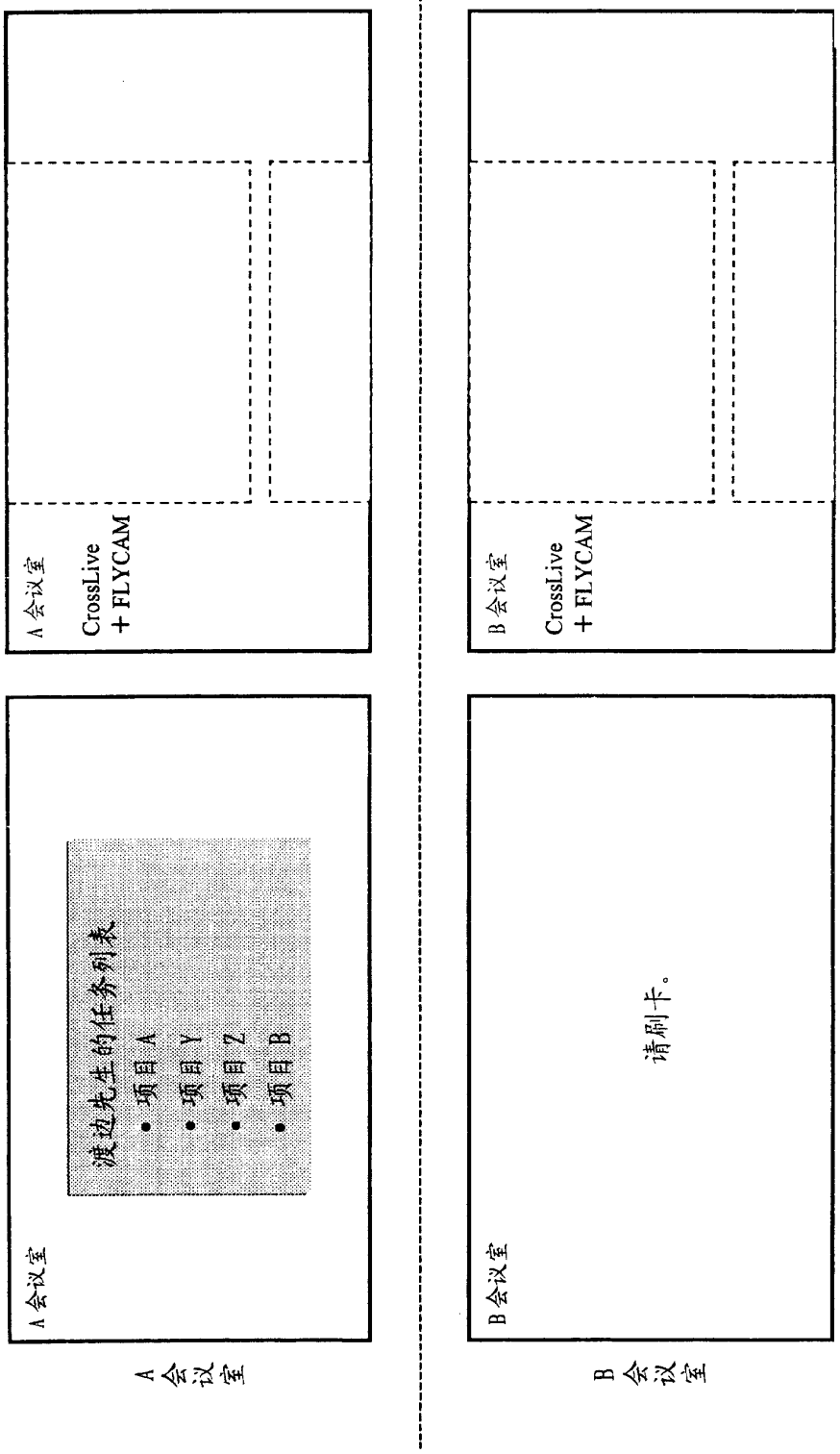


图 6

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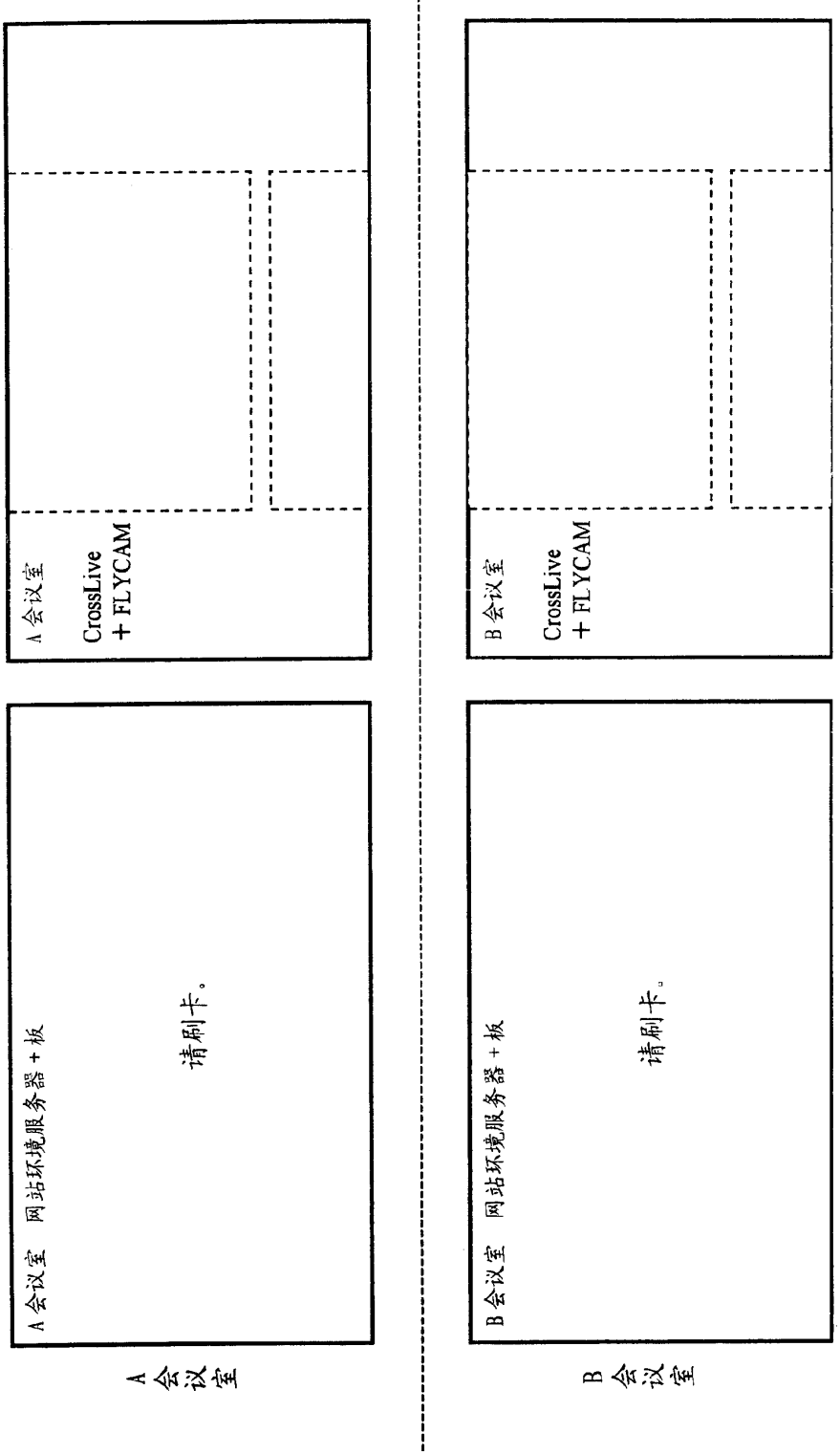


图 7

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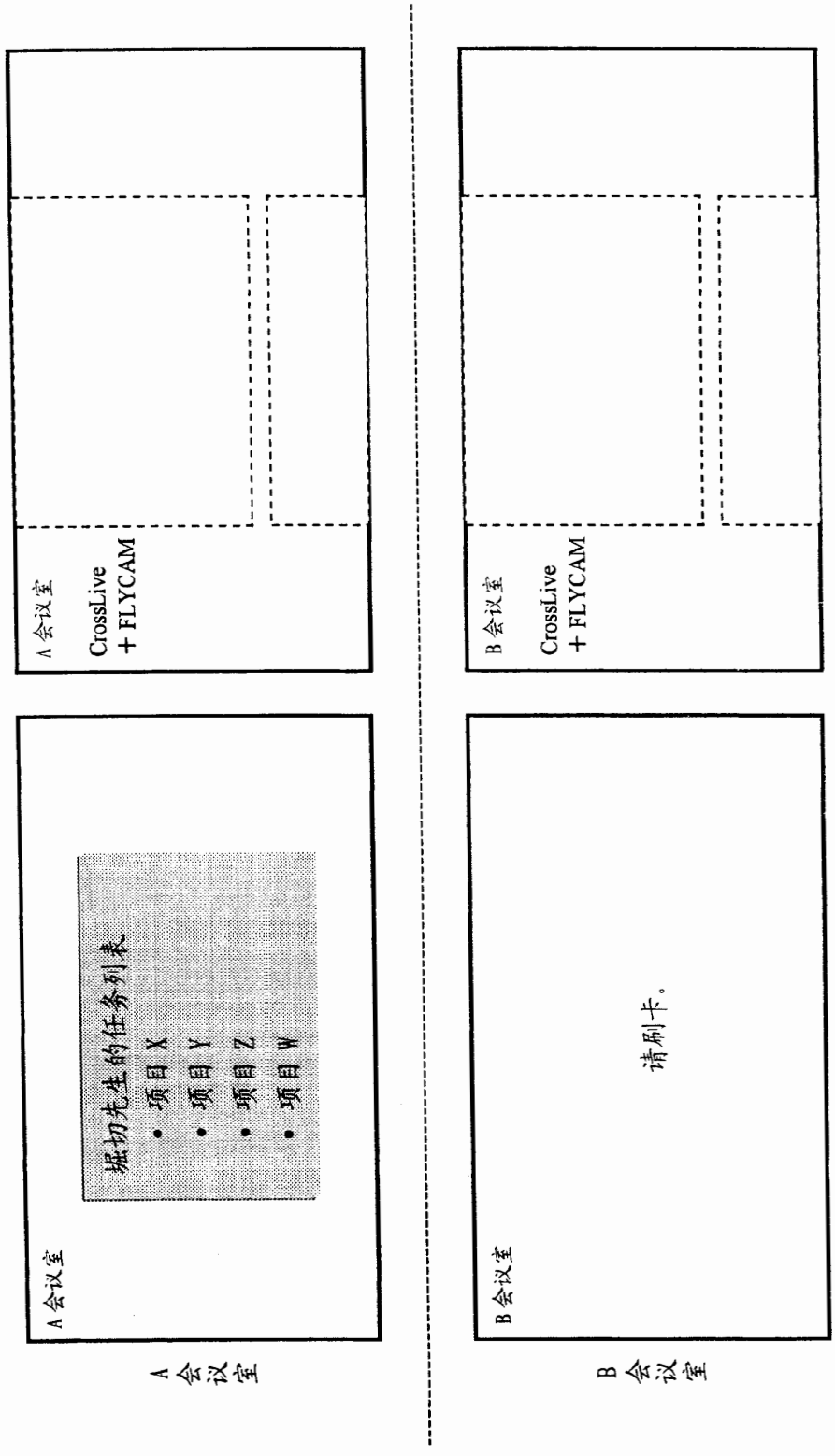


图 8

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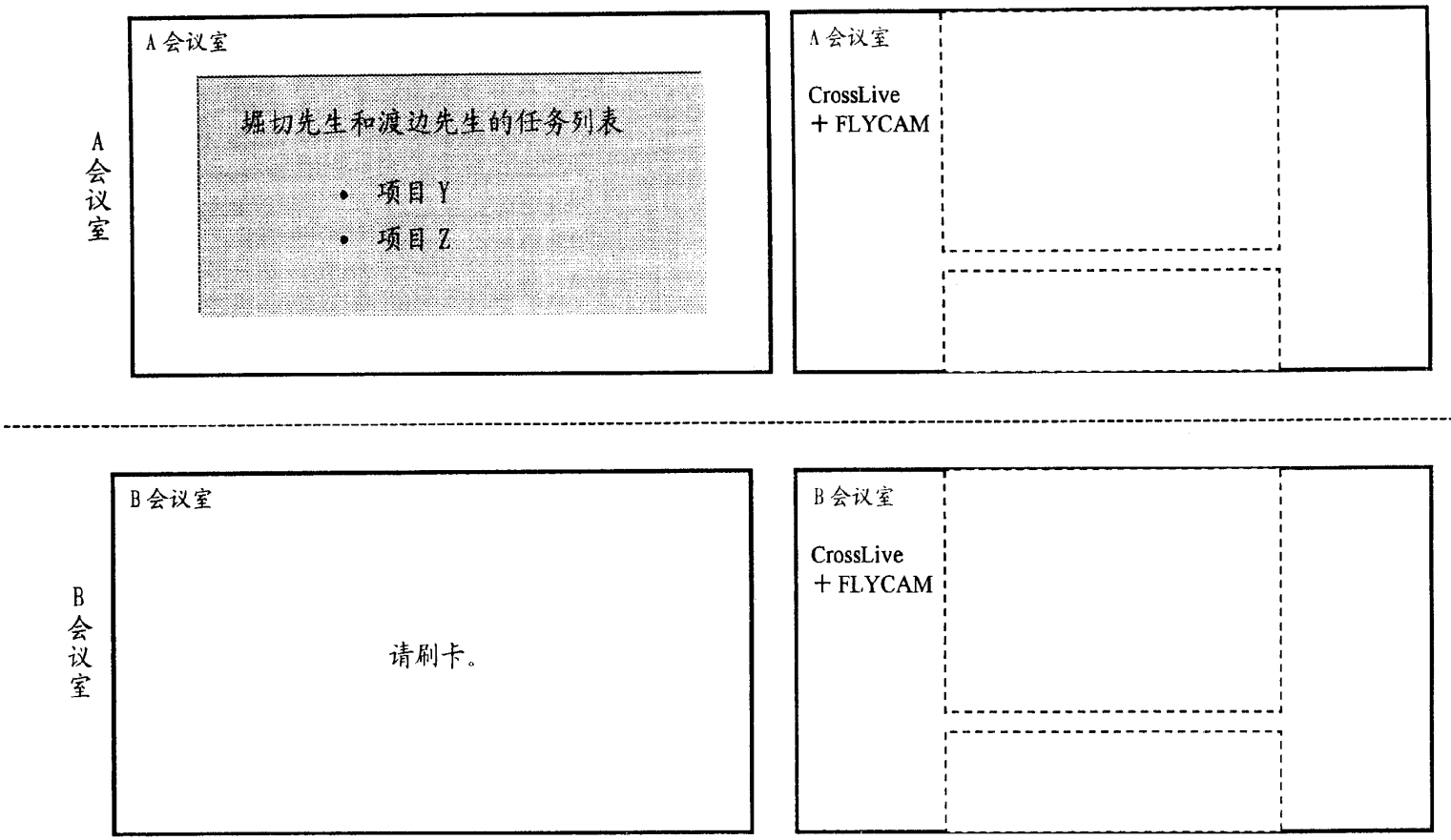

A 会议室
堀切先生和渡边先生的任务列表
• 项目 Y
• 项目 Z
A 会议室
CrossLive
＋ FLYCAM
A
会
议
室
B 会议室
请刷卡。
B 会议室
CrossLive
＋ FLYCAM
B
会
议
室

图 9

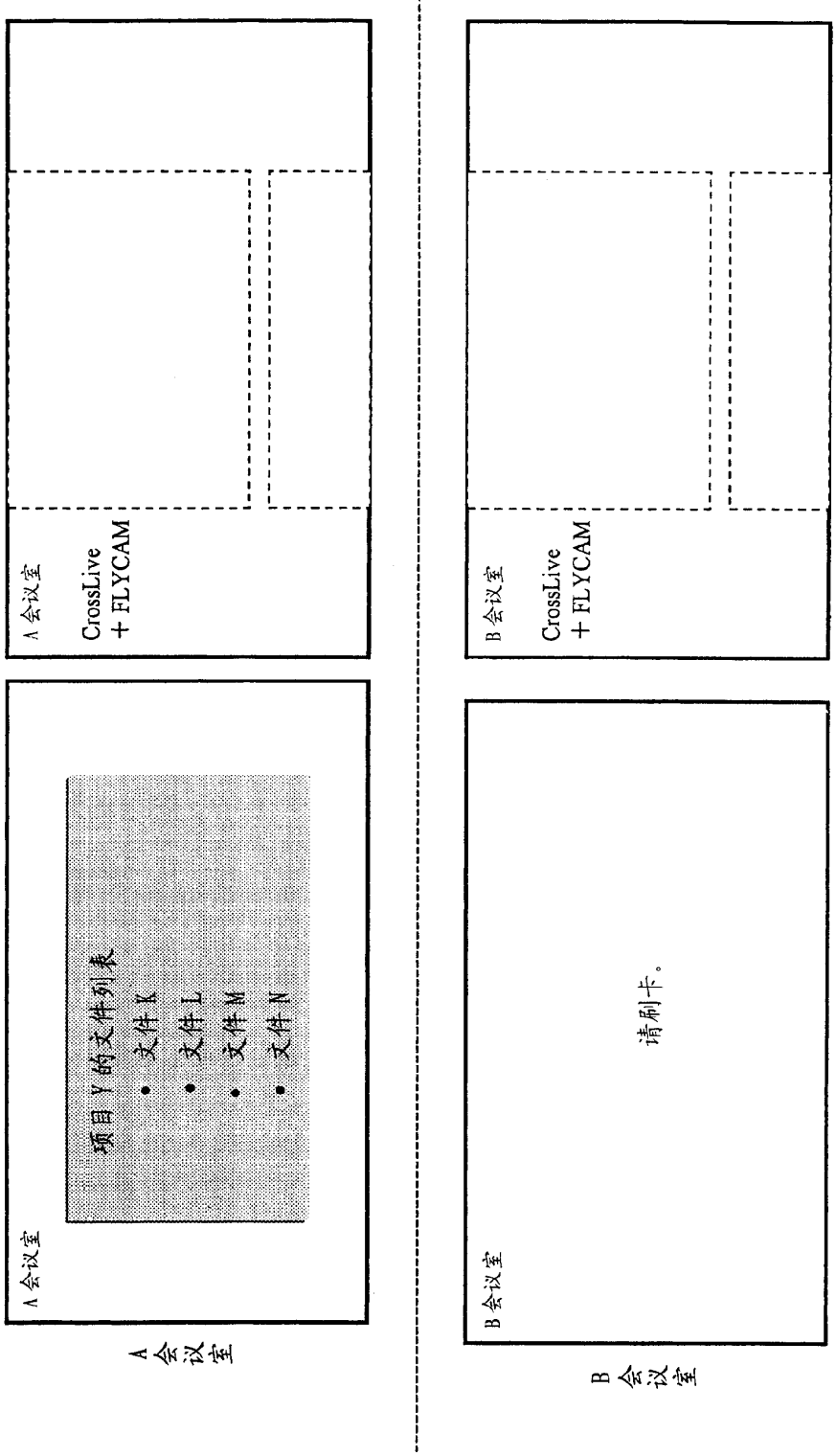


图 10

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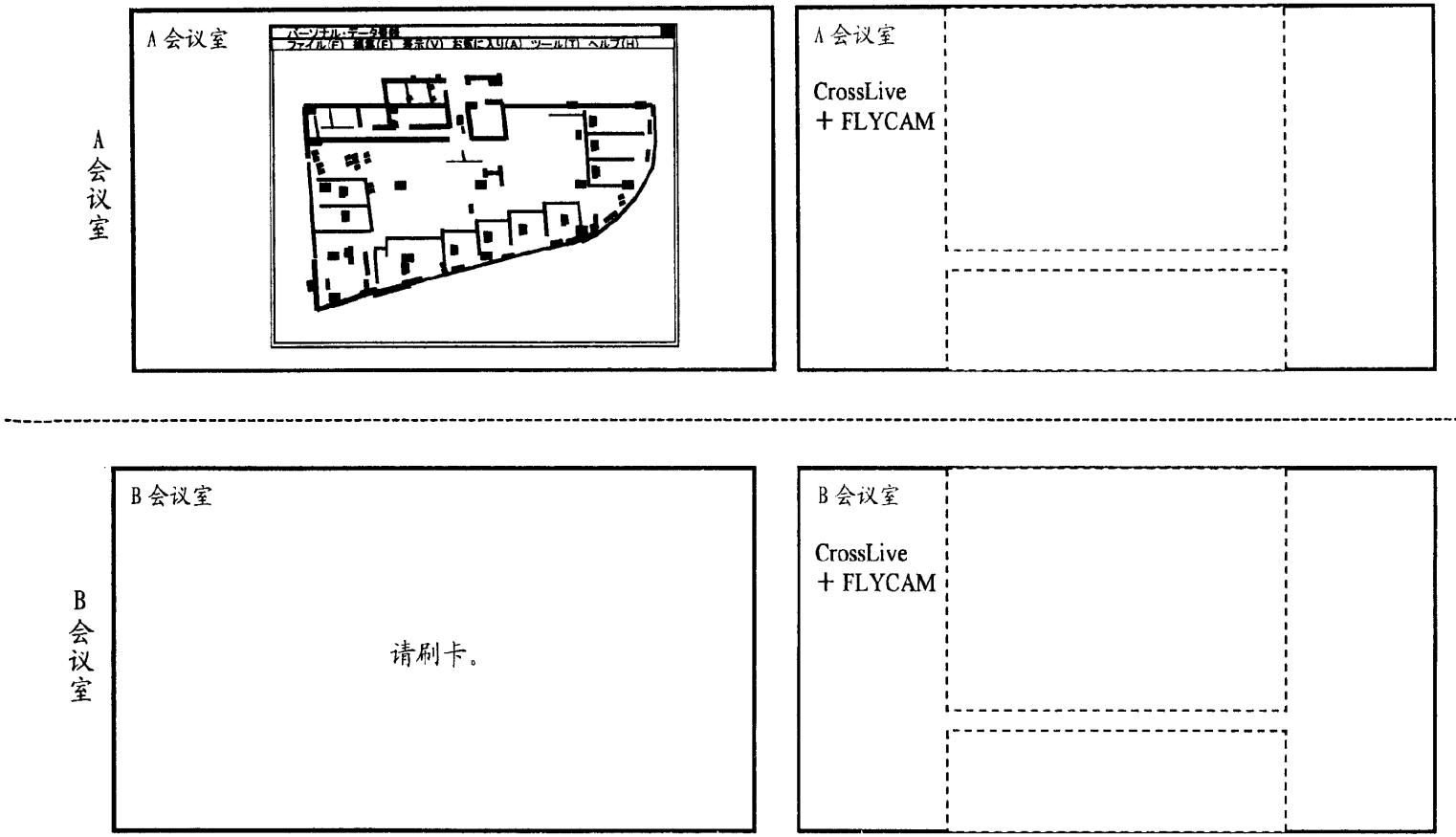


图 11

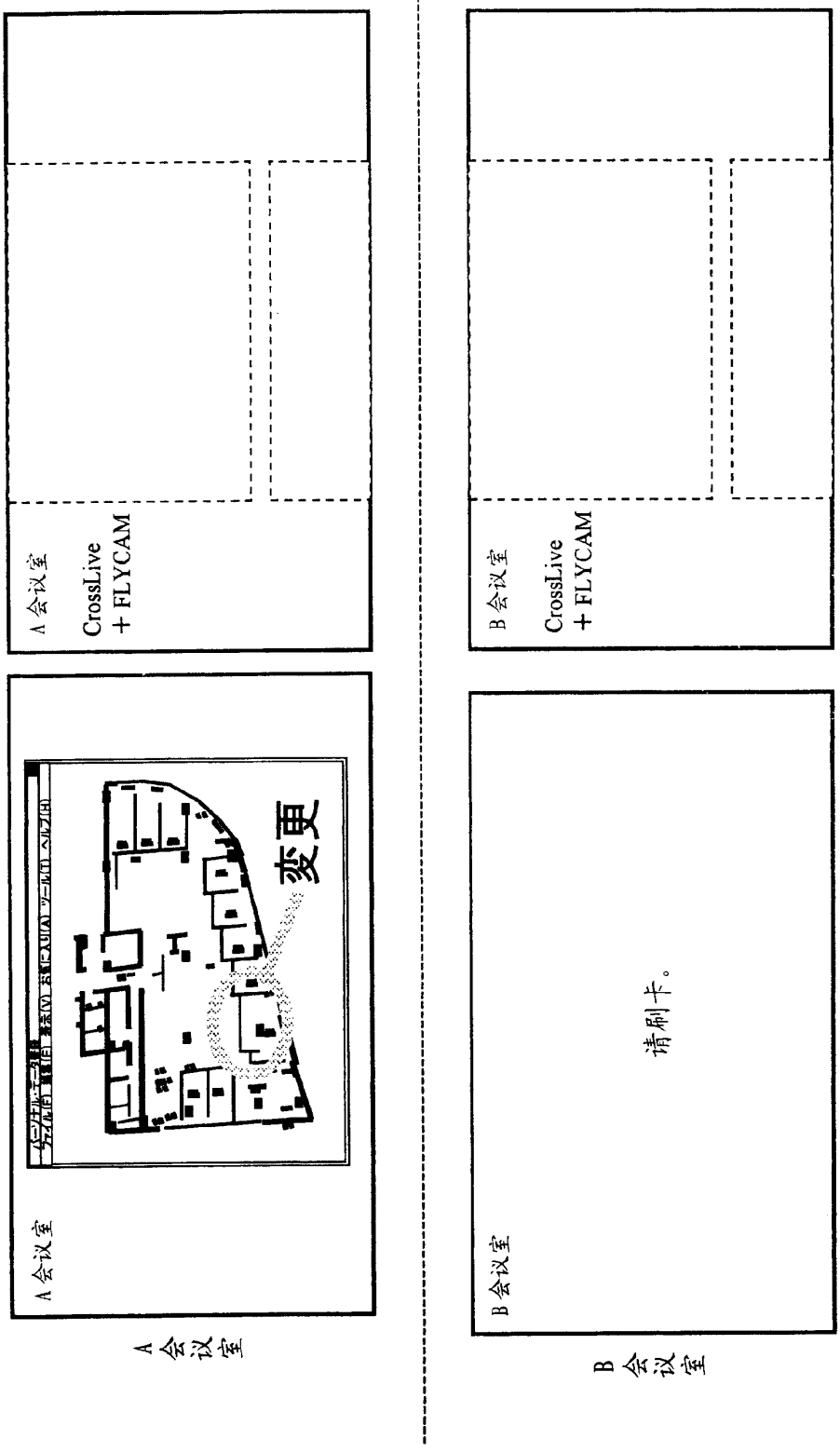

A会议室
CrossLive
+ FLYCAM
A会议室
变更
A会议室
B会议室
CrossLive
+ FLYCAM
B会议室
请刷卡。
B会议室

图 12

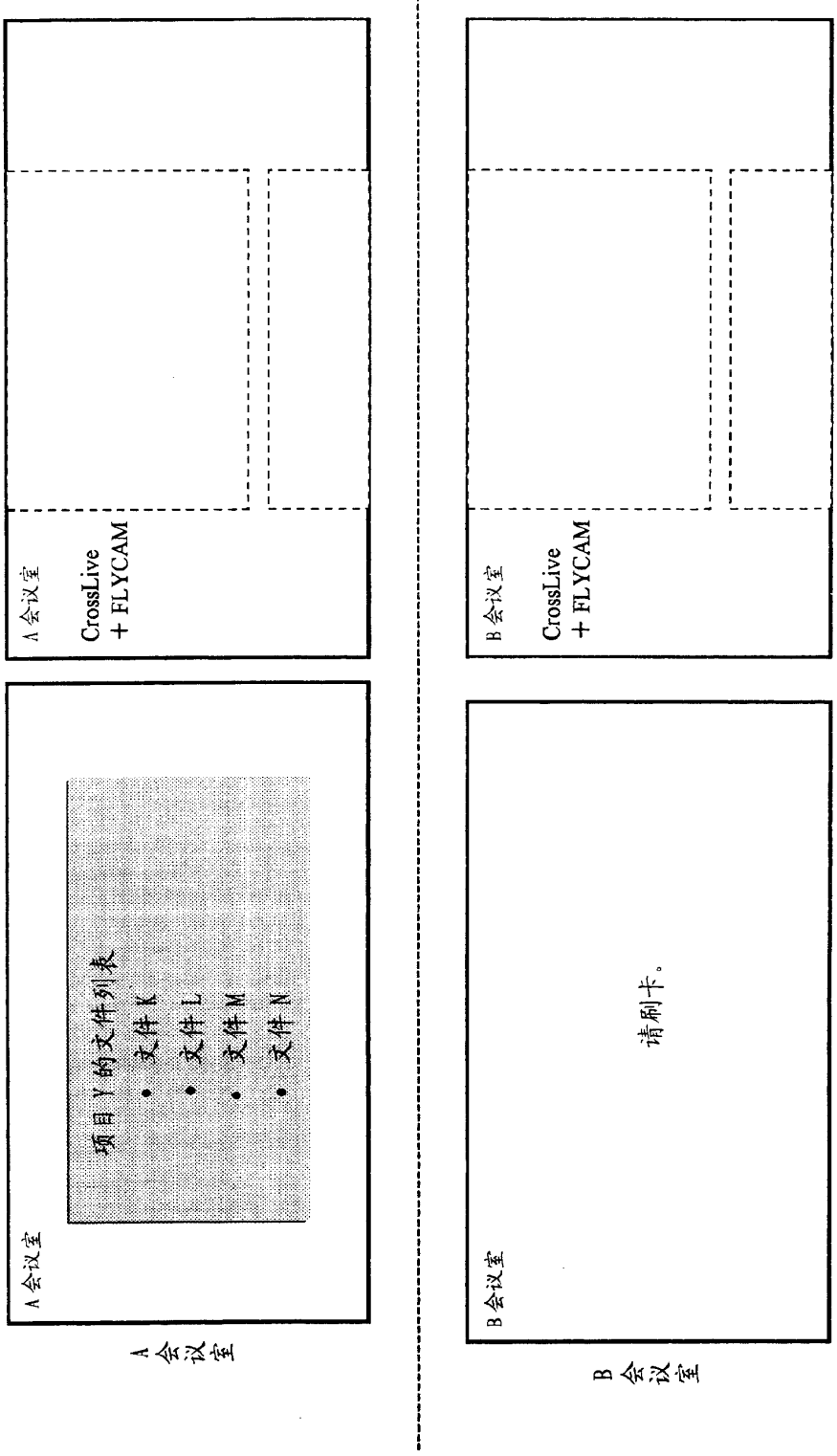


图 13

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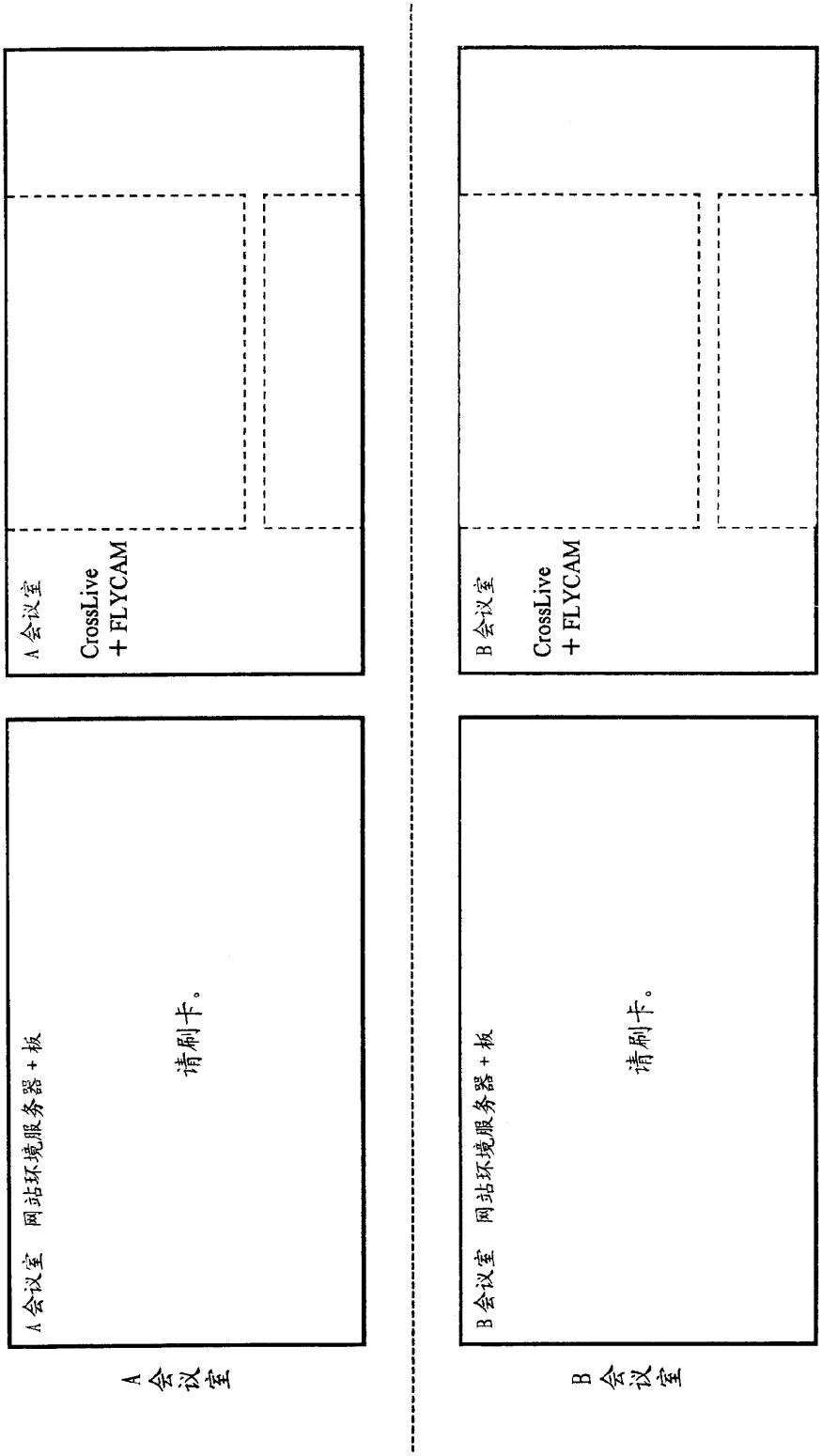


图 14

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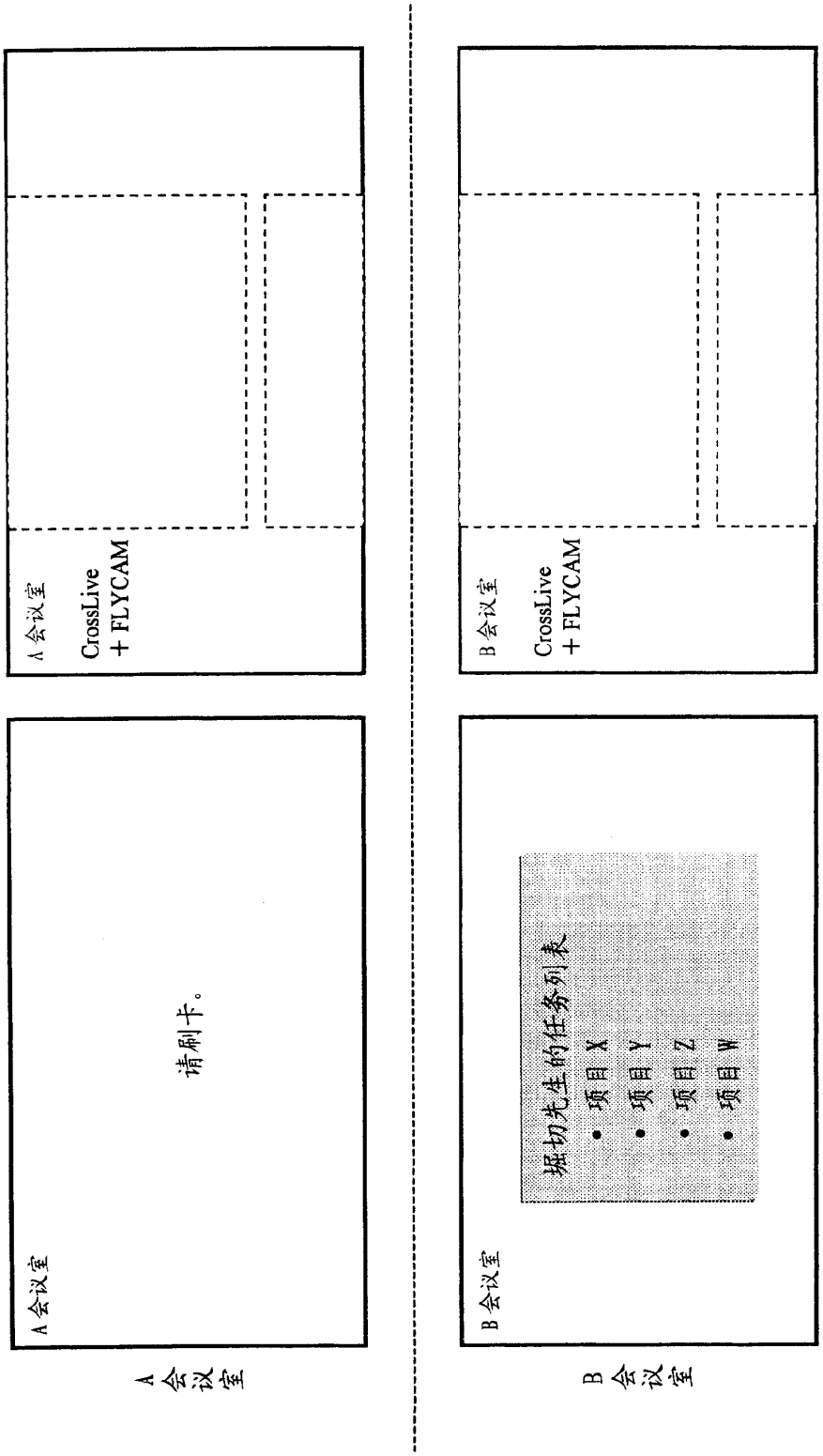


图 15

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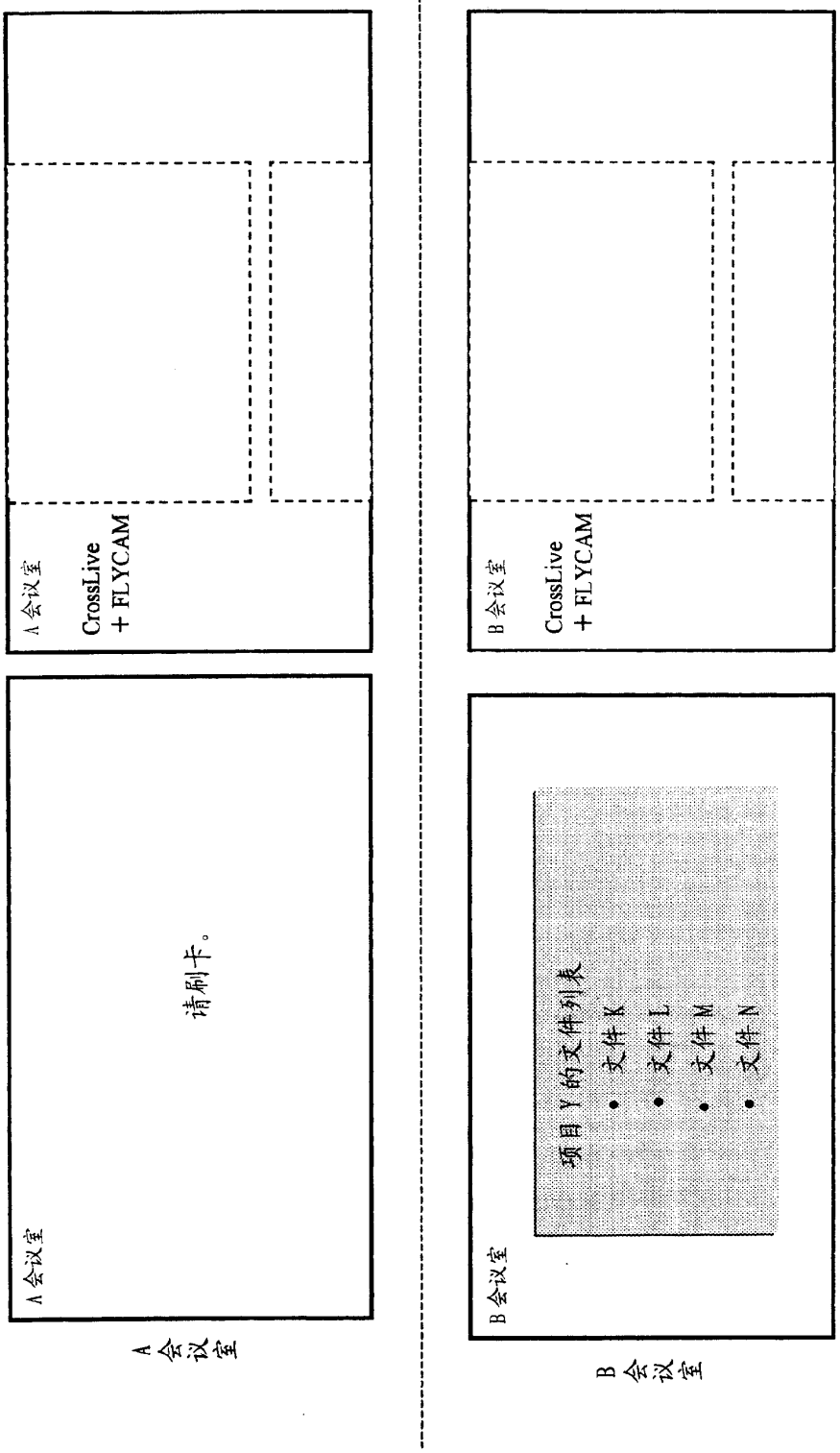


图 16

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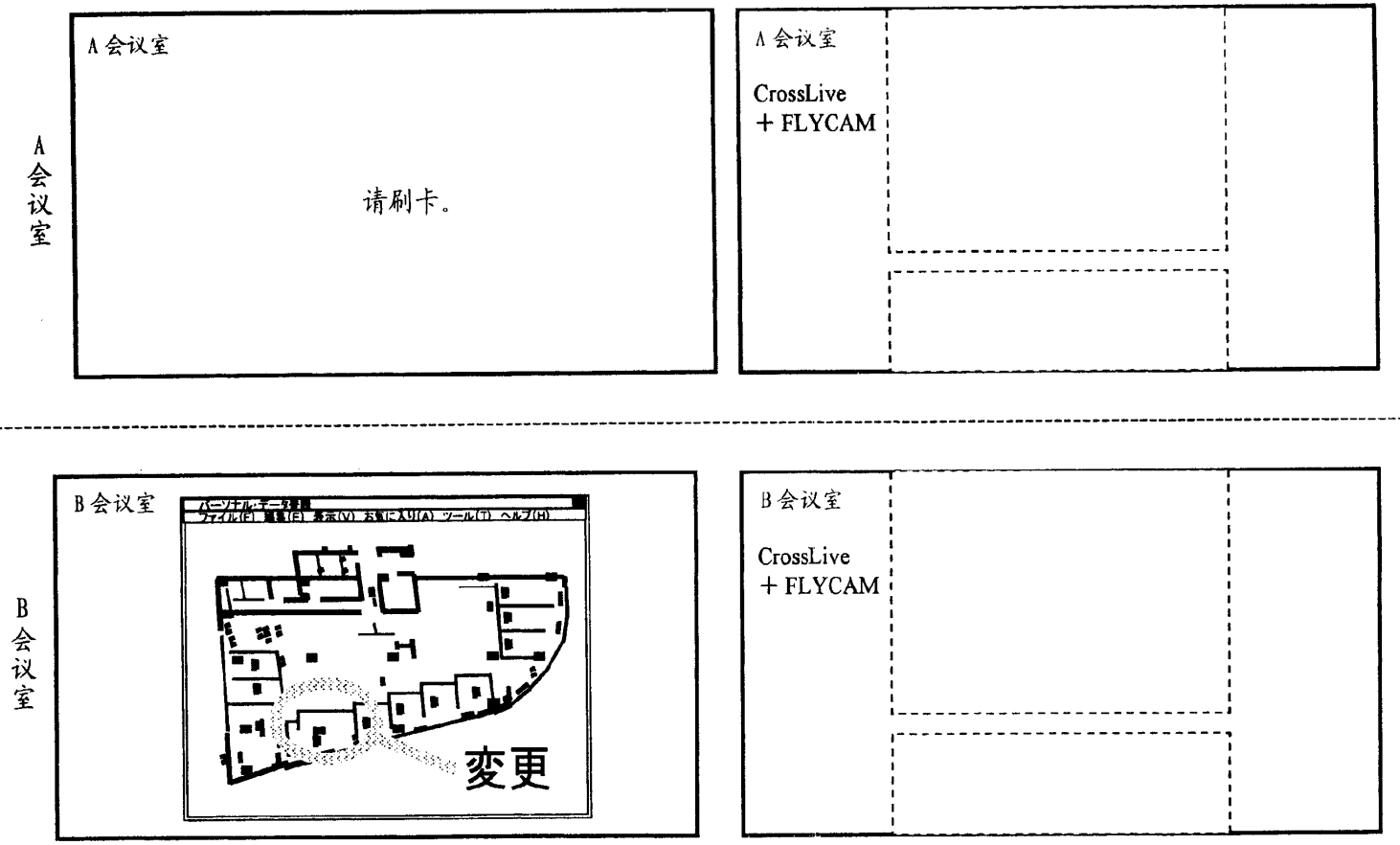

A会议室
请刷卡。
A会议室
CrossLive
＋FLYCAM
B会议室
B会议室
变更
B会议室
CrossLive
＋FLYCAM

图 17

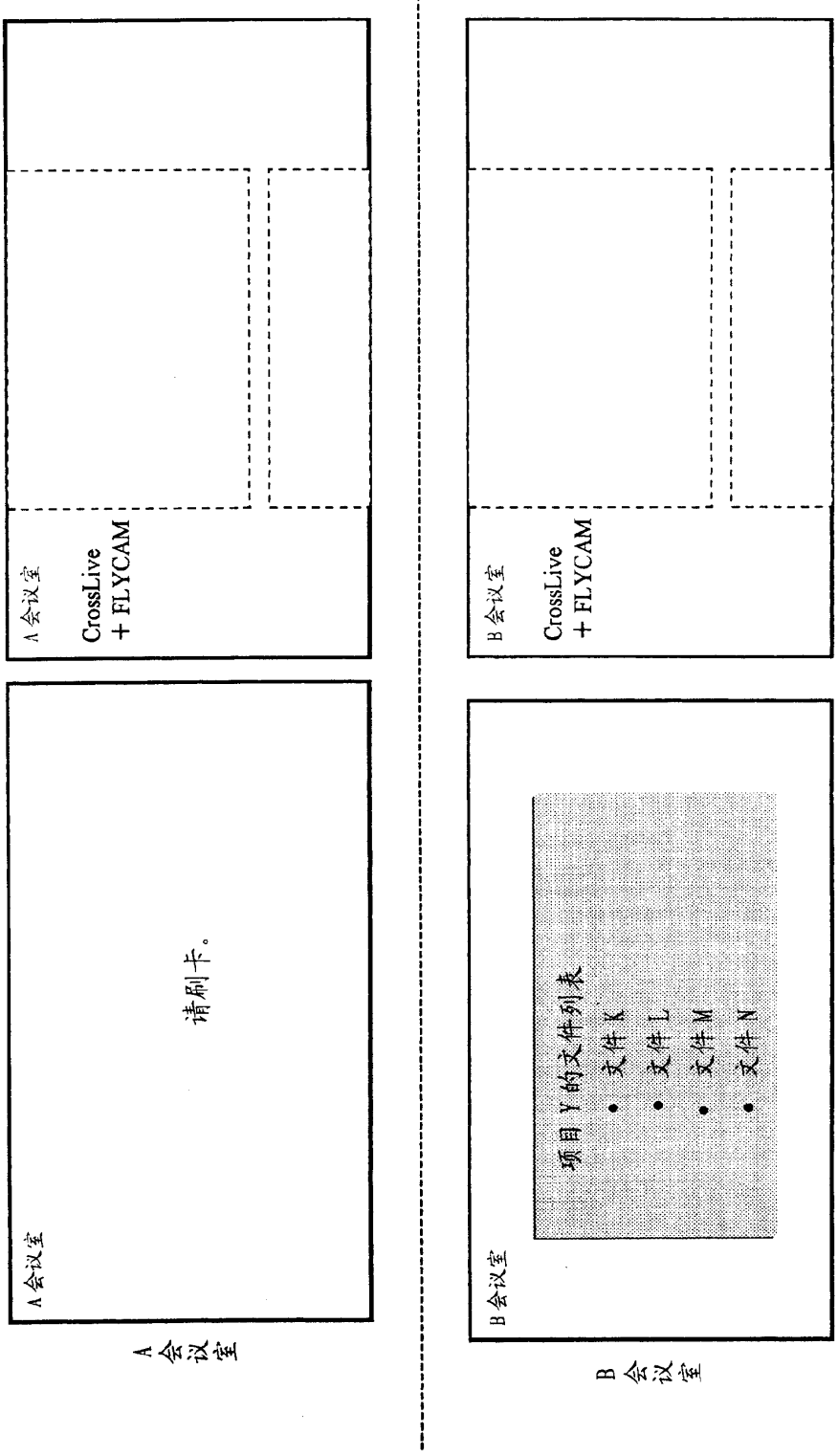


图 18

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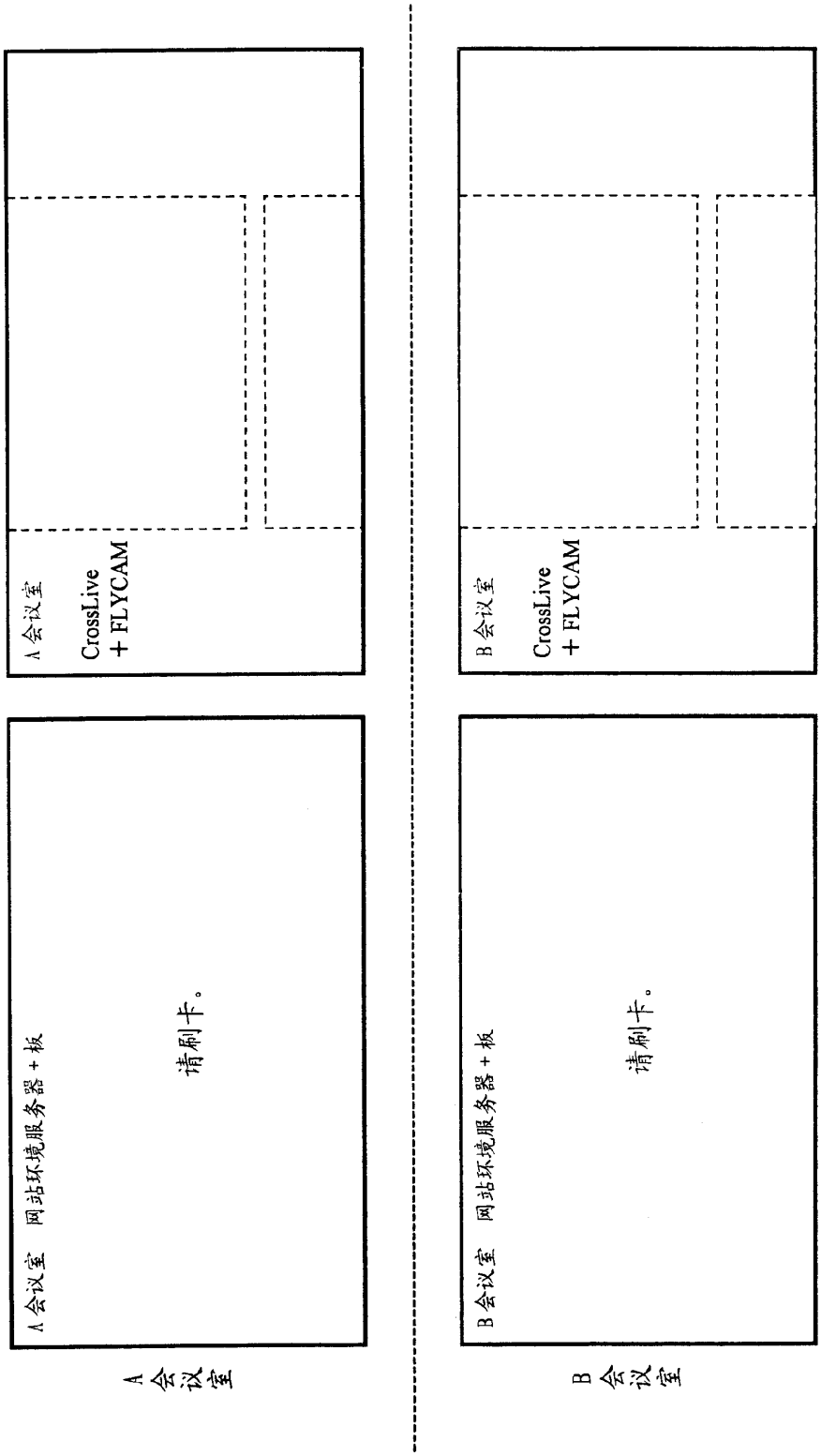


图 19

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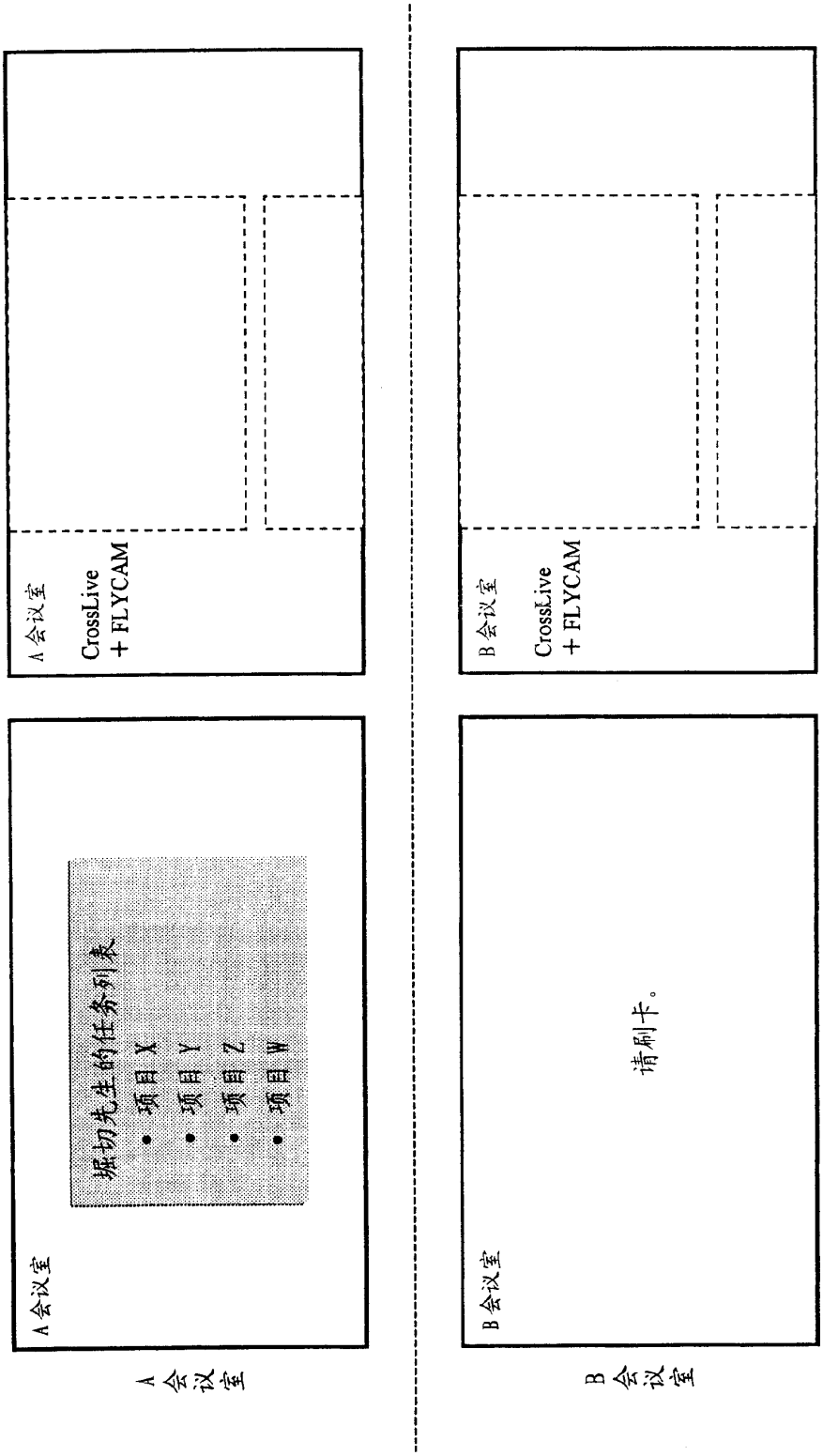


图 20

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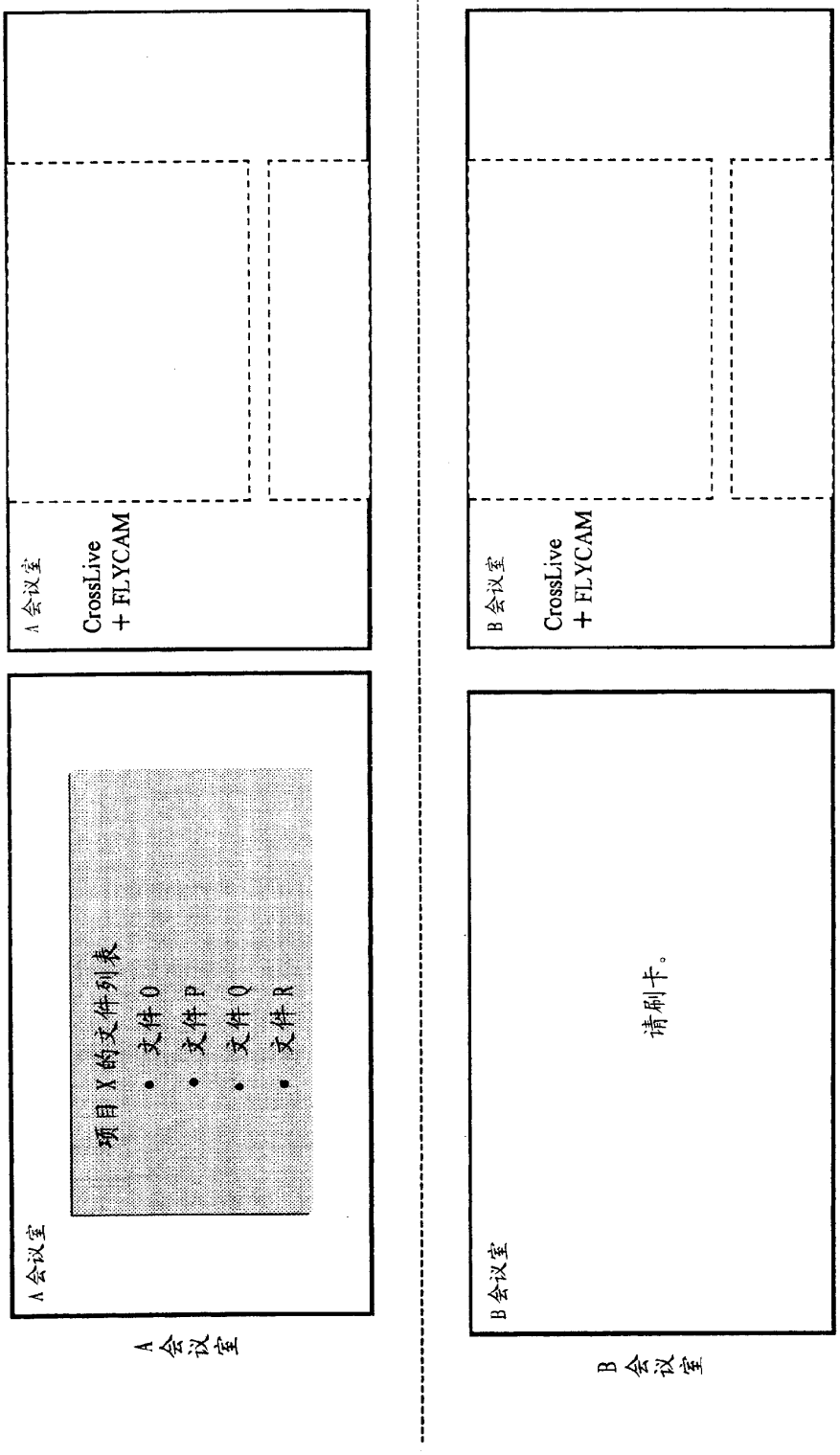


图 21

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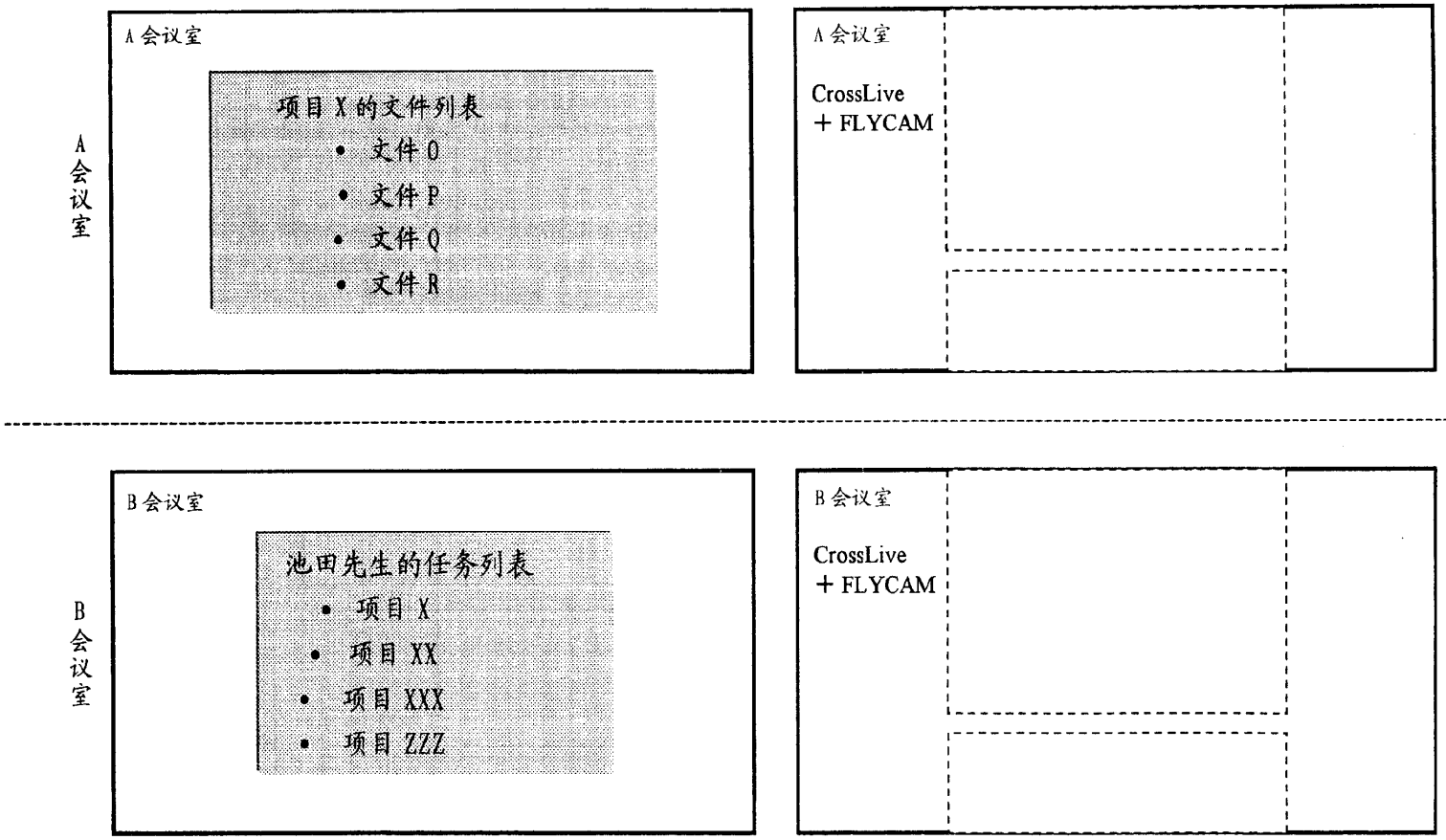

A 会议室
项目 X 的文件列表
• 文件 O
• 文件 P
• 文件 Q
• 文件 R
A 会议室
CrossLive
+ FLYCAM
A 会议室
B 会议室
池田先生的任务列表
• 项目 X
• 项目 XX
• 项目 XXX
• 项目 ZZZ
B 会议室
CrossLive
+ FLYCAM
B 会议室

图 22

62

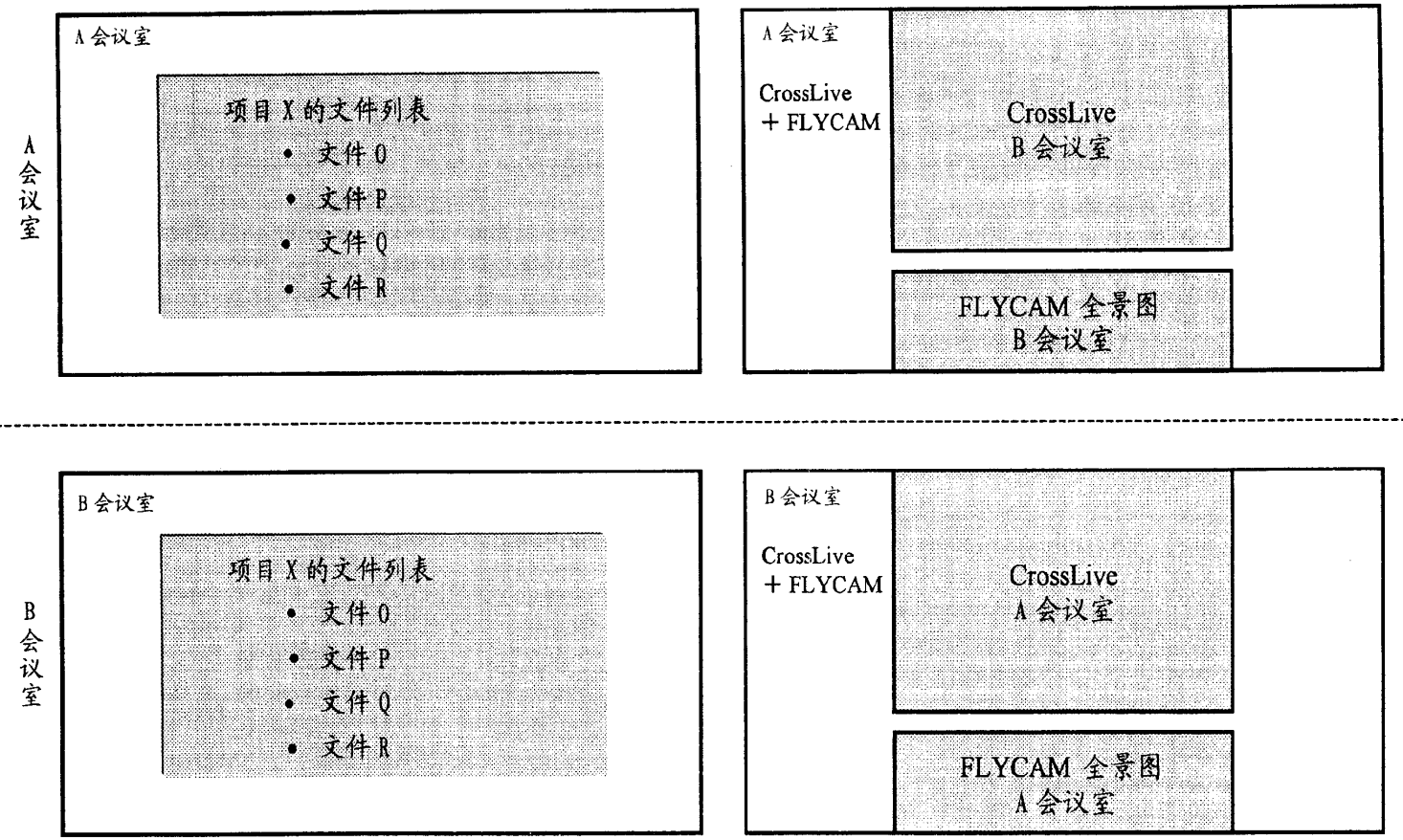

A 会议室
项目 X 的文件列表
• 文件 O
• 文件 P
• 文件 Q
• 文件 R
A 会议室
CrossLive
+ FLYCAM
CrossLive
B 会议室
FLYCAM 全景图
B 会议室
B 会议室
项目 X 的文件列表
• 文件 O
• 文件 P
• 文件 Q
• 文件 R
B 会议室
CrossLive
+ FLYCAM
CrossLive
A 会议室
FLYCAM 全景图
A 会议室

图 23

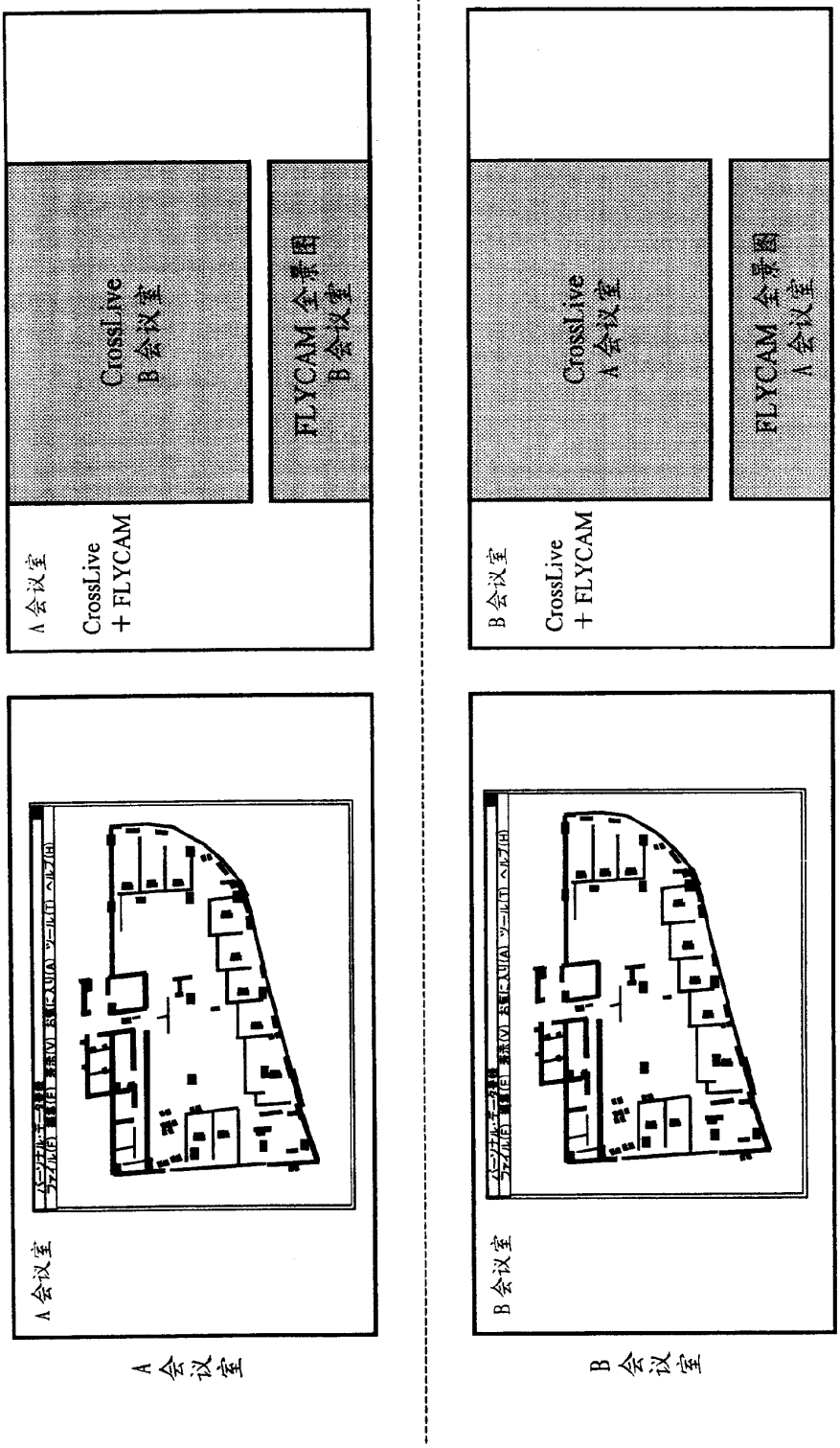


图 24

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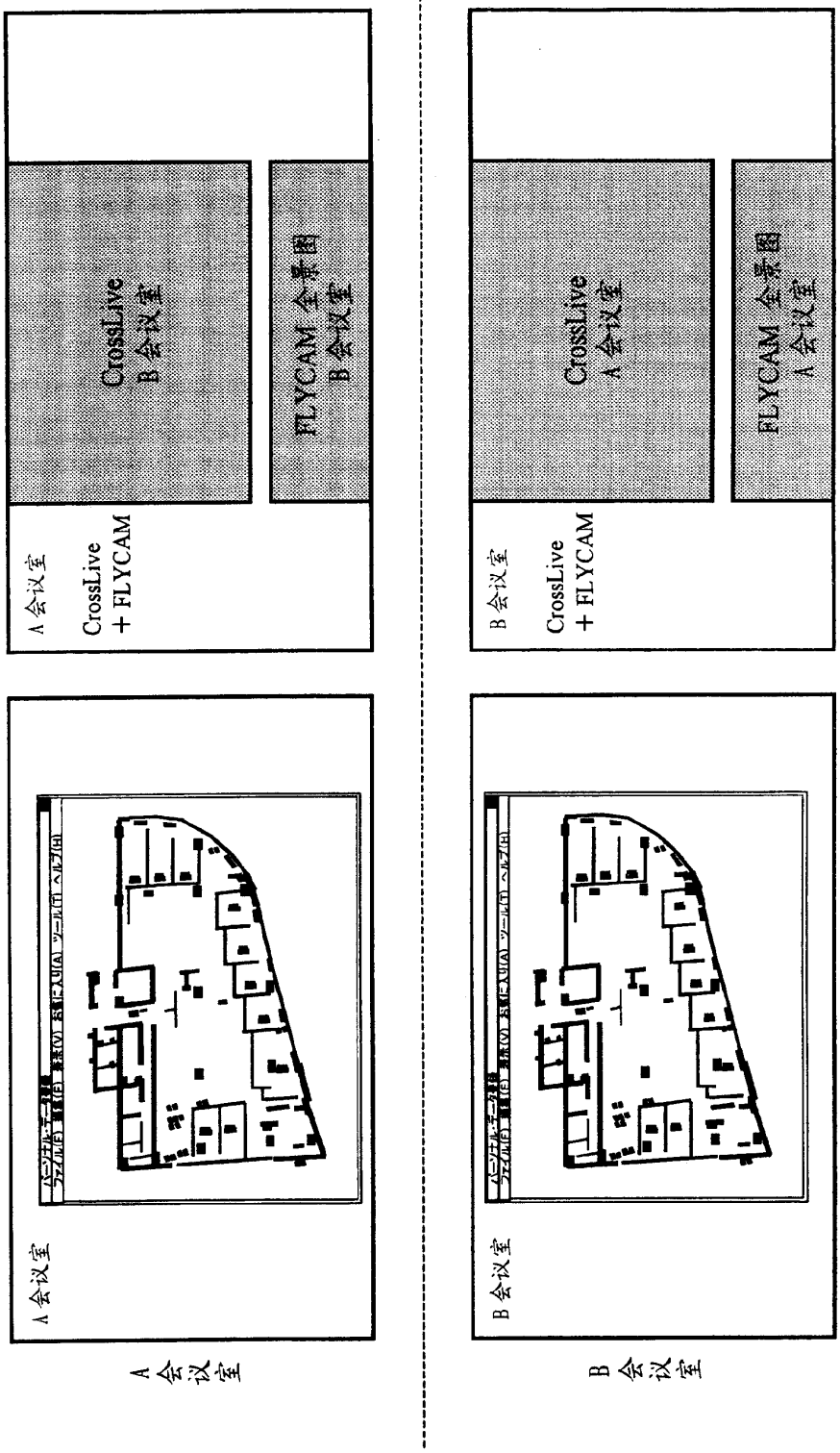


图 25

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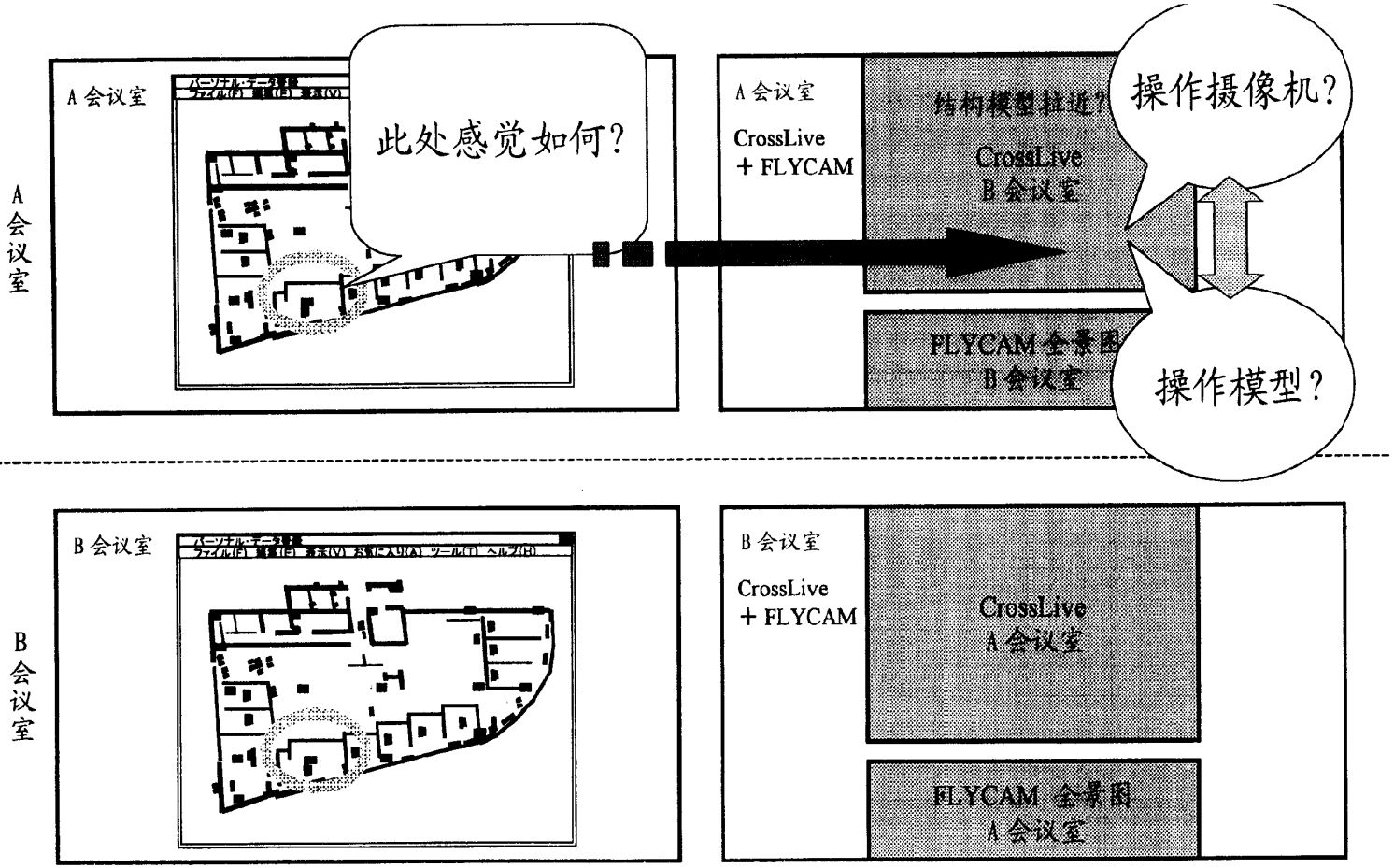

A 会议室
此处感觉如何?
A 会议室
CrossLive
+ FLYCAM
结构模型拉近?
CrossLive
B 会议室
操作摄像机?
FLYCAM 全景图
B 会议室
操作模型?
A
会议室
B 会议室
B 会议室
CrossLive
+ FLYCAM
CrossLive
A 会议室
FLYCAM 全景图
A 会议室
B
会议室

图 26

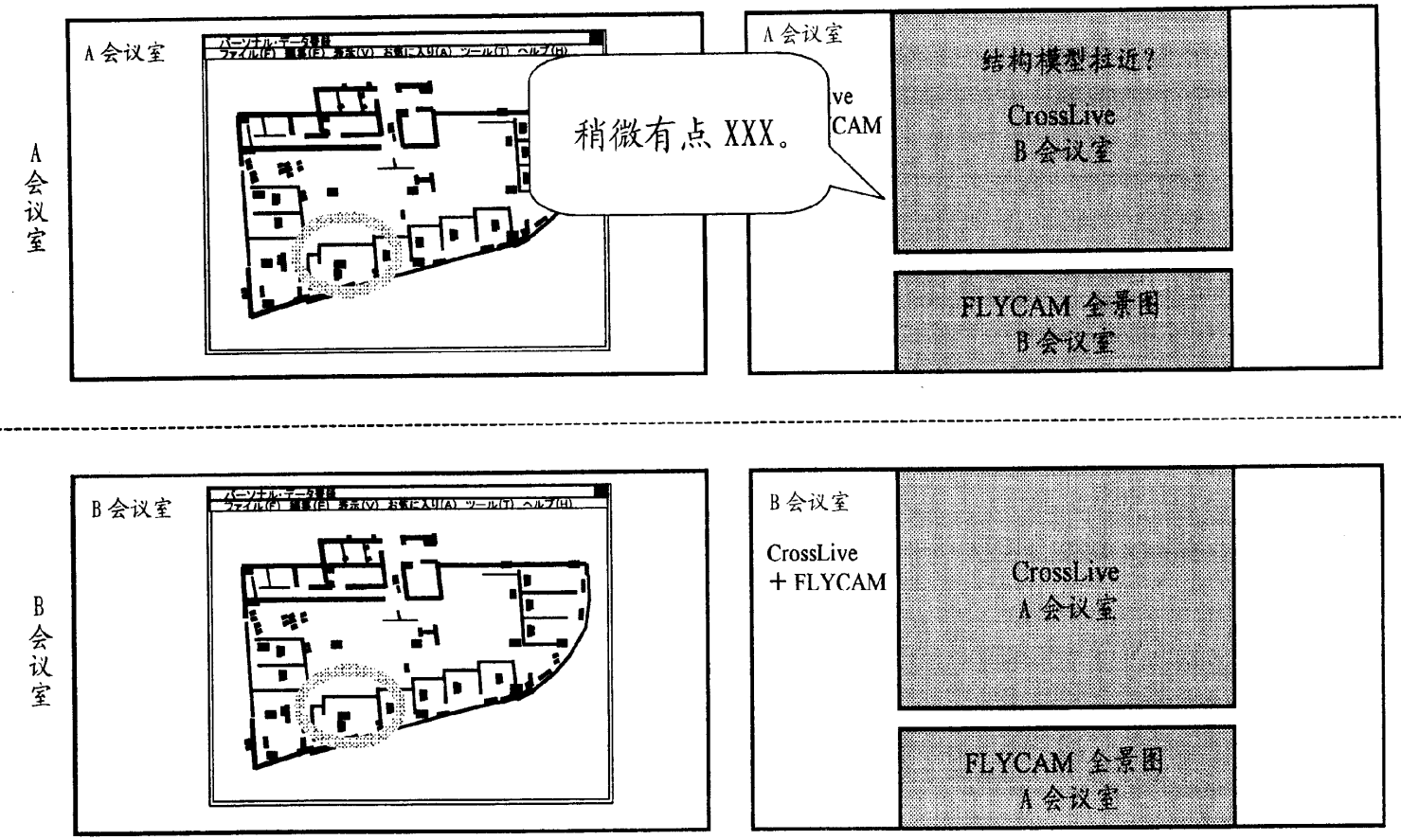

A 会议室
A 会议室
稍微有点 XXX。
ve
CAM
结构模型拉近?
CrossLive
B 会议室
FLYCAM 全景图
B 会议室
B 会议室
B 会议室
CrossLive
＋ FLYCAM
CrossLive
A 会议室
FLYCAM 全景图
A 会议室

图 27

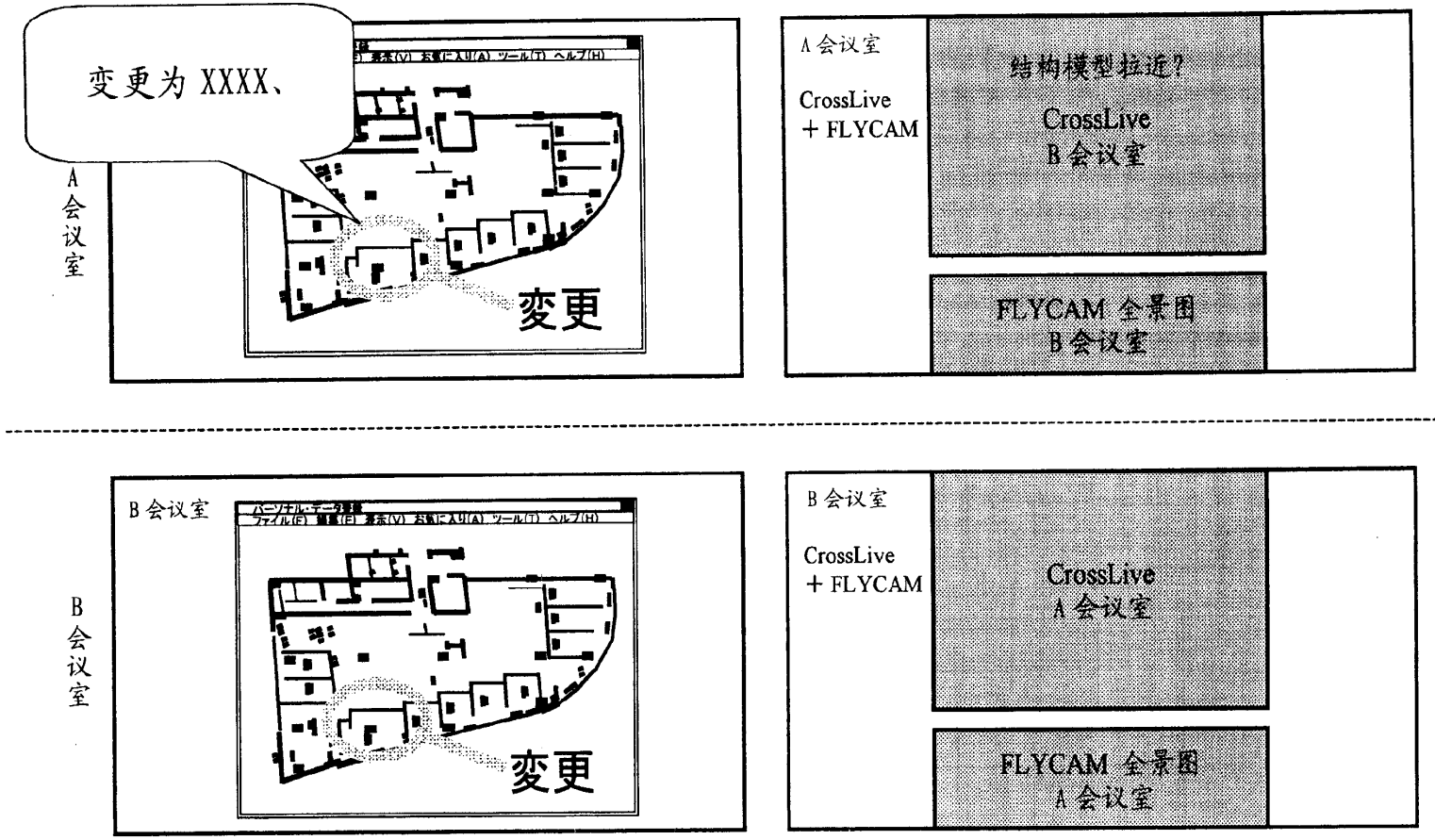

变更为 XXXX、
A 会议室
变更
A 会议室
CrossLive
＋ FLYCAM
结构模型拉近?
CrossLive
B 会议室
FLYCAM 全景图
B 会议室
B 会议室
B 会议室
变更
B 会议室
CrossLive
＋ FLYCAM
CrossLive
A 会议室
FLYCAM 全景图
A 会议室

图 28

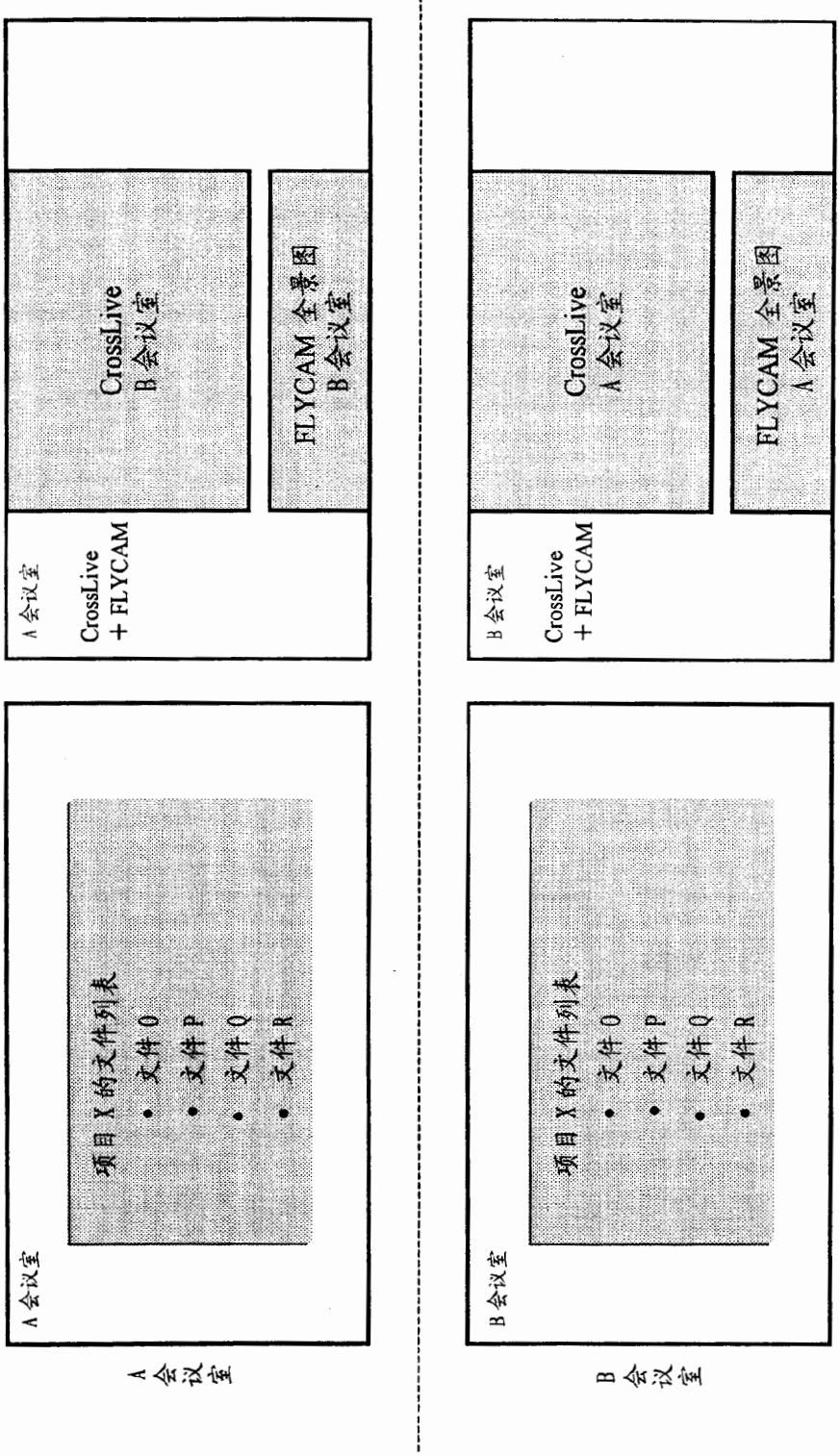


图 29

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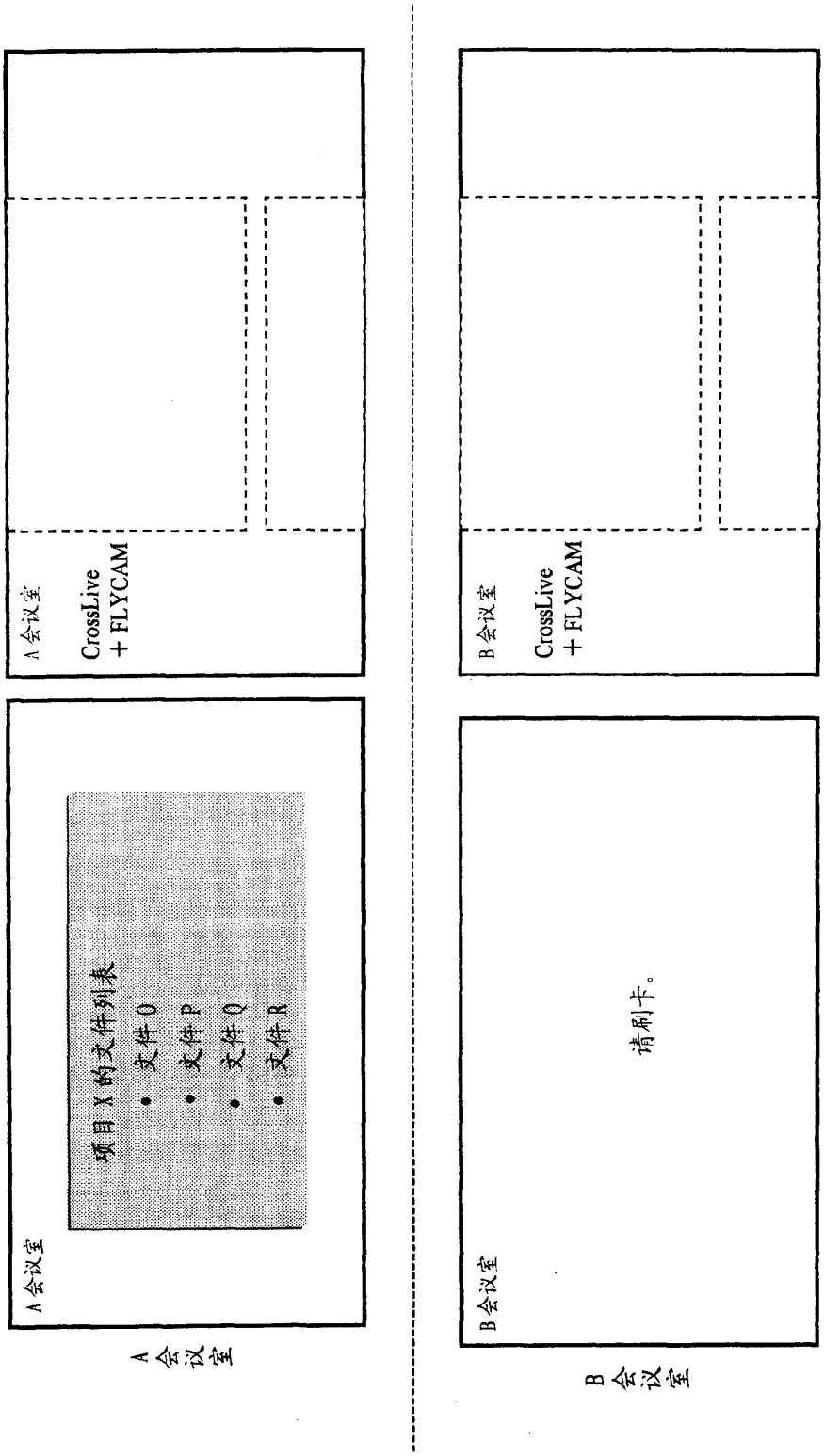


图 30

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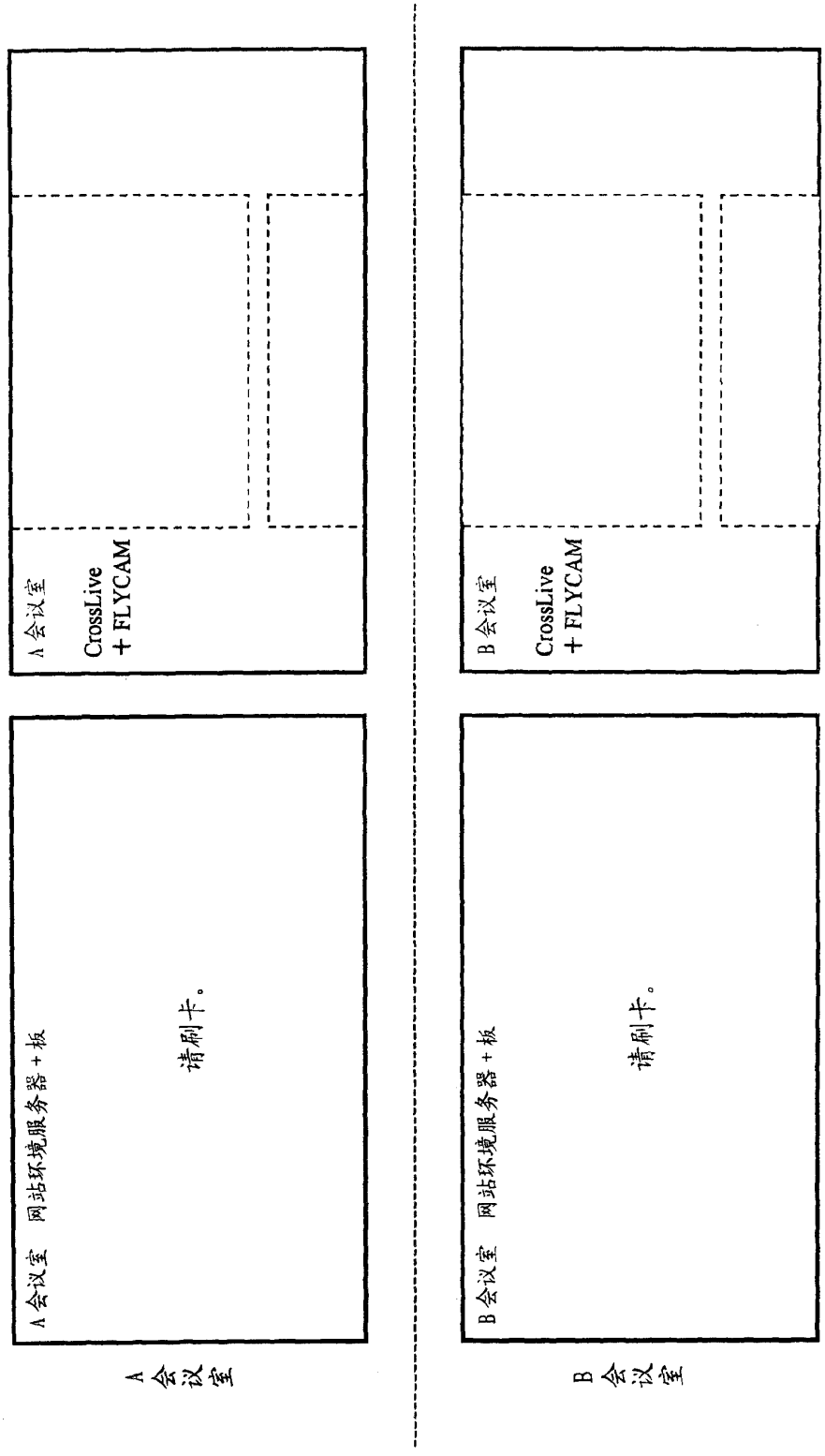


图 31

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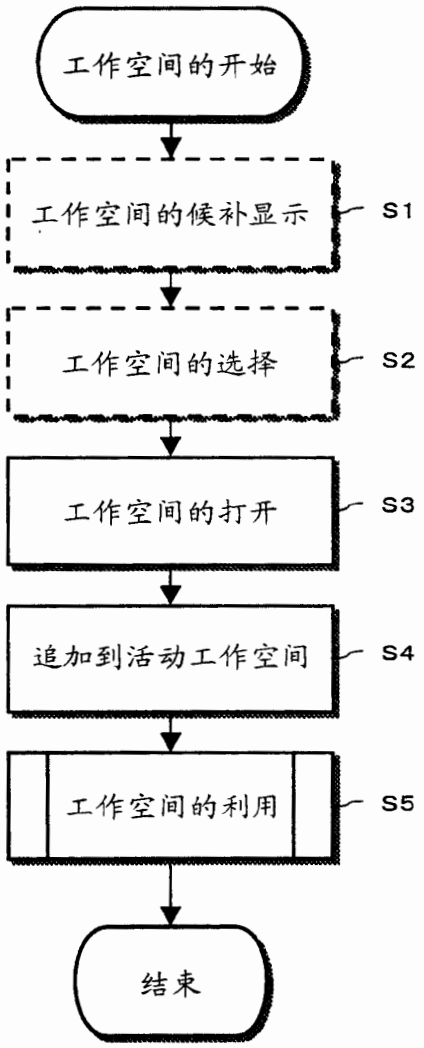

工作空间的开始
工作空间的候补显示
S1
工作空间的选择
S2
工作空间的打开
S3
追加到活动工作空间
S4
工作空间的利用
S5
结束

图 32

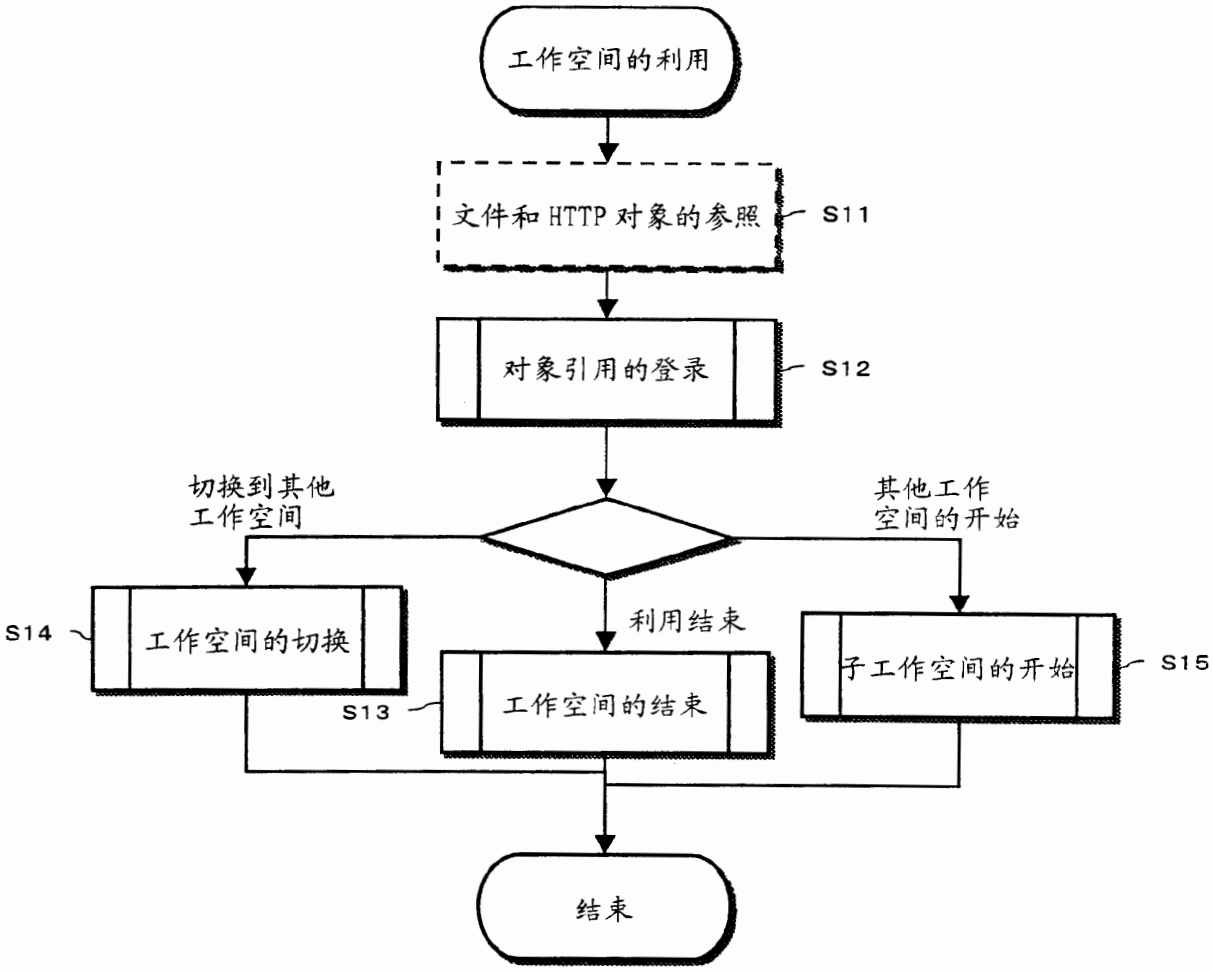

工作空间的利用
文件和 HTTP 对象的参照
S11
对象引用的登录
S12
切换到其他
工作空间
其他工作
空间的开始
S14
工作空间的切换
利用结束
S13
工作空间的结束
子工作空间的开始
S15
结束

图 33

图 34

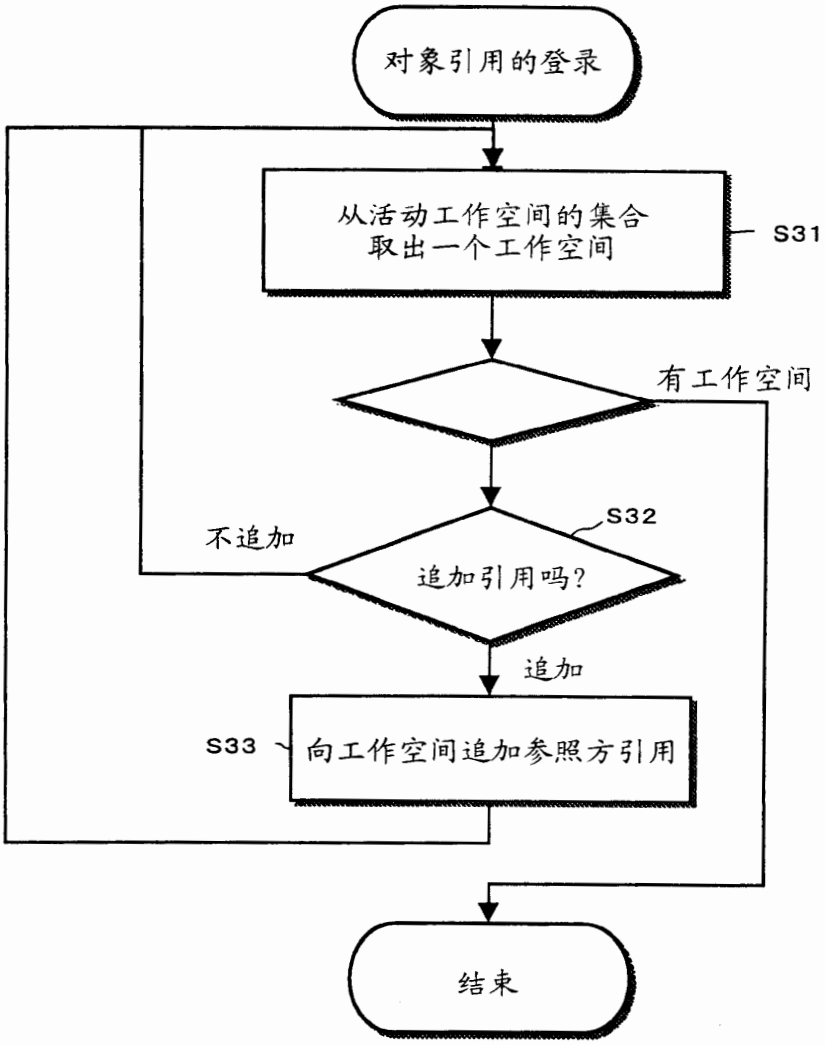

对象引用的登录
从活动工作空间的集合
取出一个工作空间
S31
有工作空间
S32
不追加
追加引用吗?
追加
S33
向工作空间追加参照方引用
结束

图 35

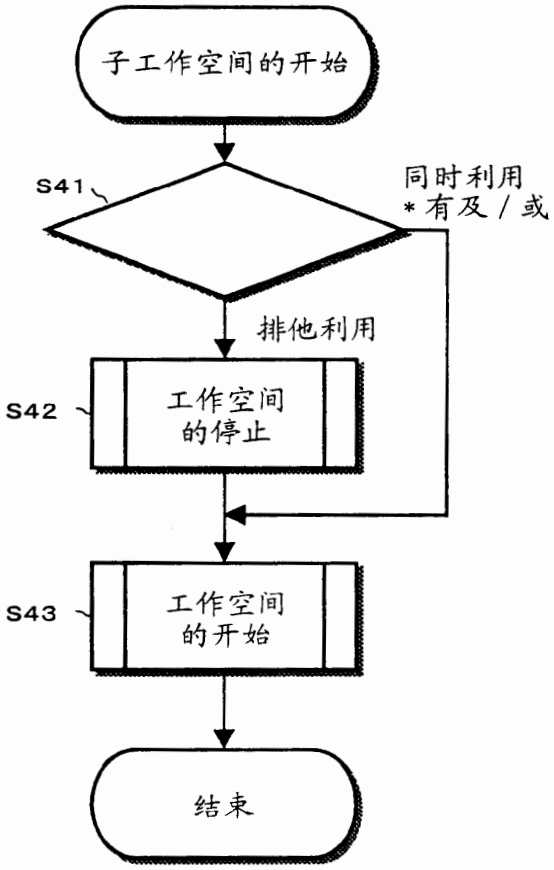

子工作空间的开始
S41
同时利用
*有及/或
排他利用
S42
工作空间
的停止
S43
工作空间
的开始
结束

图 36

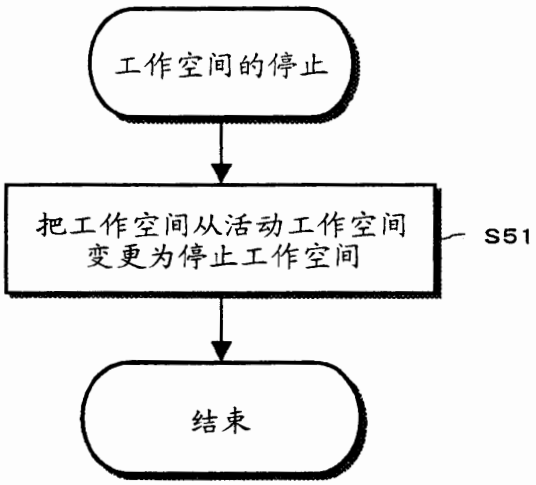

工作空间的停止
把工作空间从活动工作空间
变更为停止工作空间
S51
结束

图 37

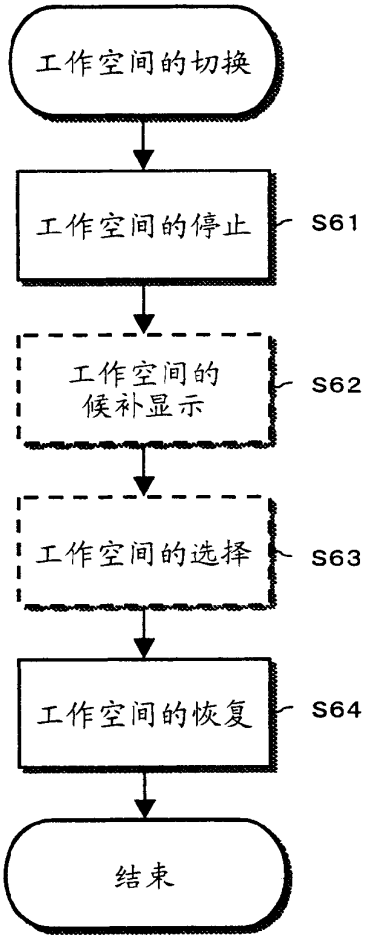

工作空间的切换
工作空间的停止
S61
工作空间的
候补显示
S62
工作空间的选择
S63
工作空间的恢复
S64
结束

图 38

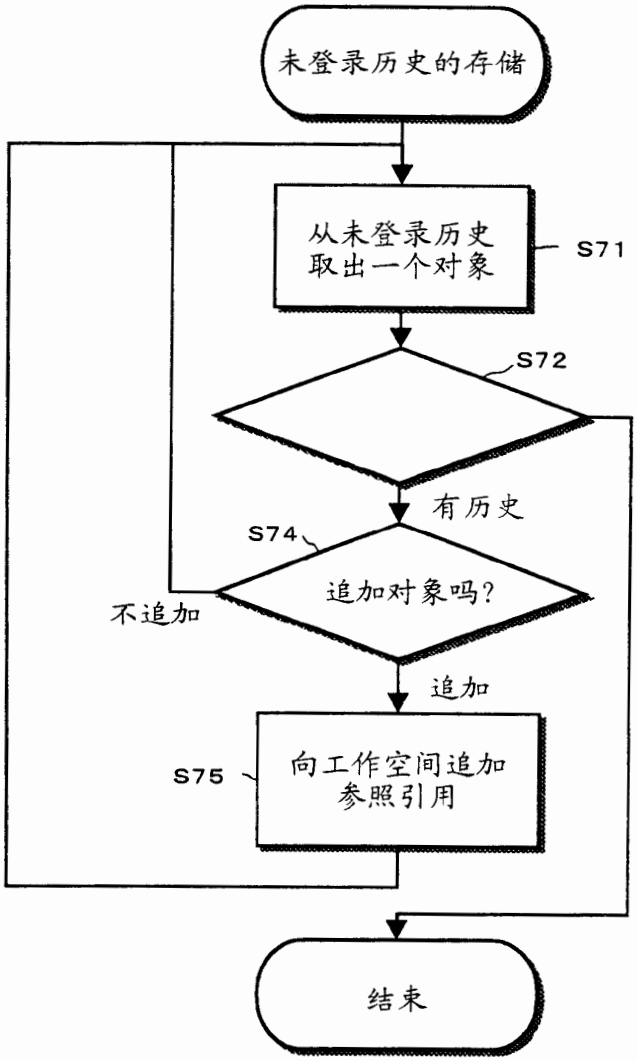

未登录历史的存储
从未登录历史
取出一个对象
S71
S72
有历史
S74
追加对象吗?
不追加
追加
S75
向工作空间追加
参照引用
结束

图 39

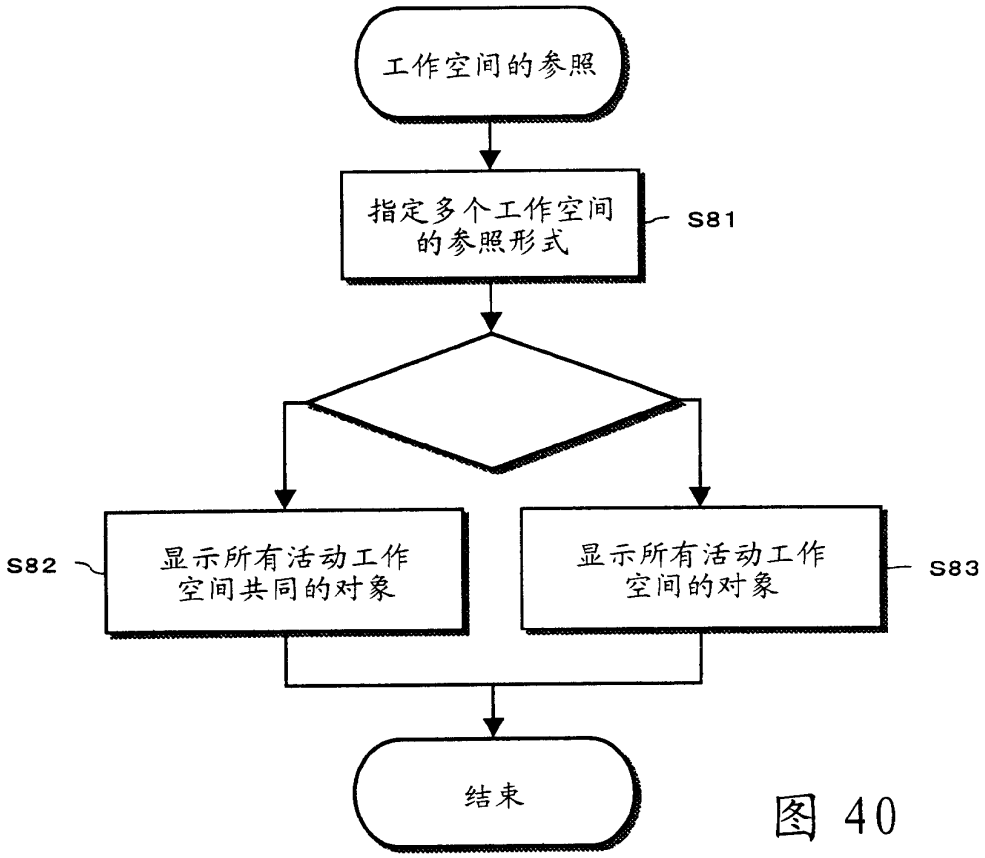

工作空间的参照
指定多个工作空间的参照形式
S81
S82
显示所有活动工作空间共同的对象
显示所有活动工作空间的对象
S83
结束

图 40

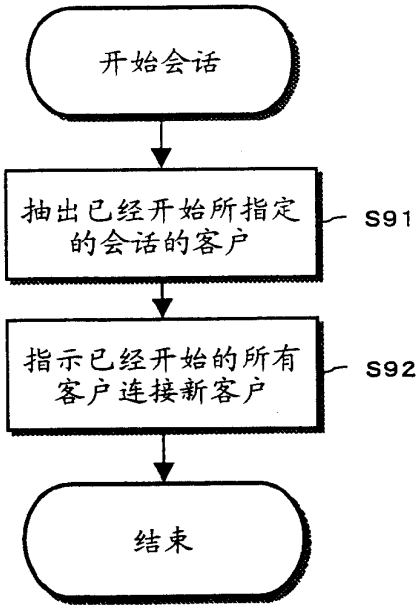

开始会话
抽出已经开始所指定的会话的客户
S91
指示已经开始的所有客户连接新客户
S92
结束

图 41

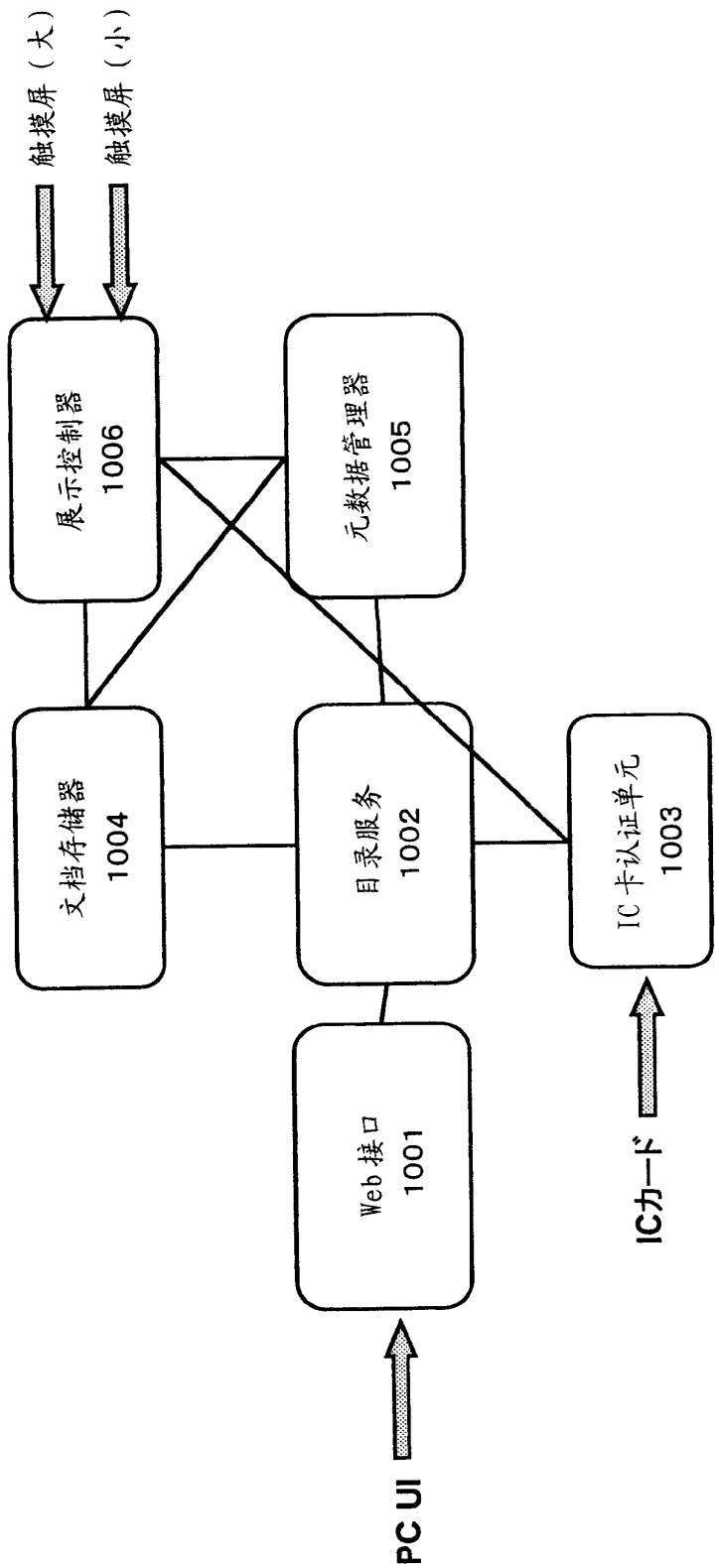

触摸屏（大）
触摸屏（小）
展示控制器
1006
元数据管理器
1005
文档存储器
1004
目录服务
1002
IC卡认证单元
1003
Web接口
1001
PC UI
IC力ード

图 42

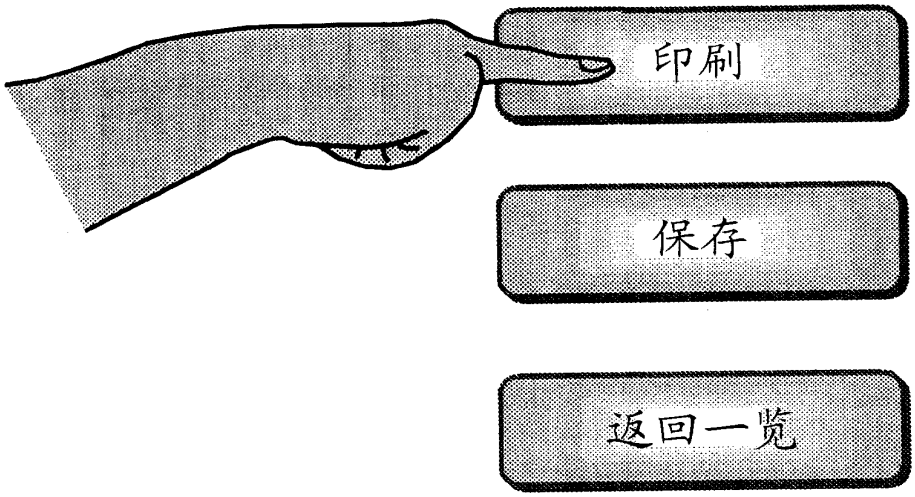


图 43

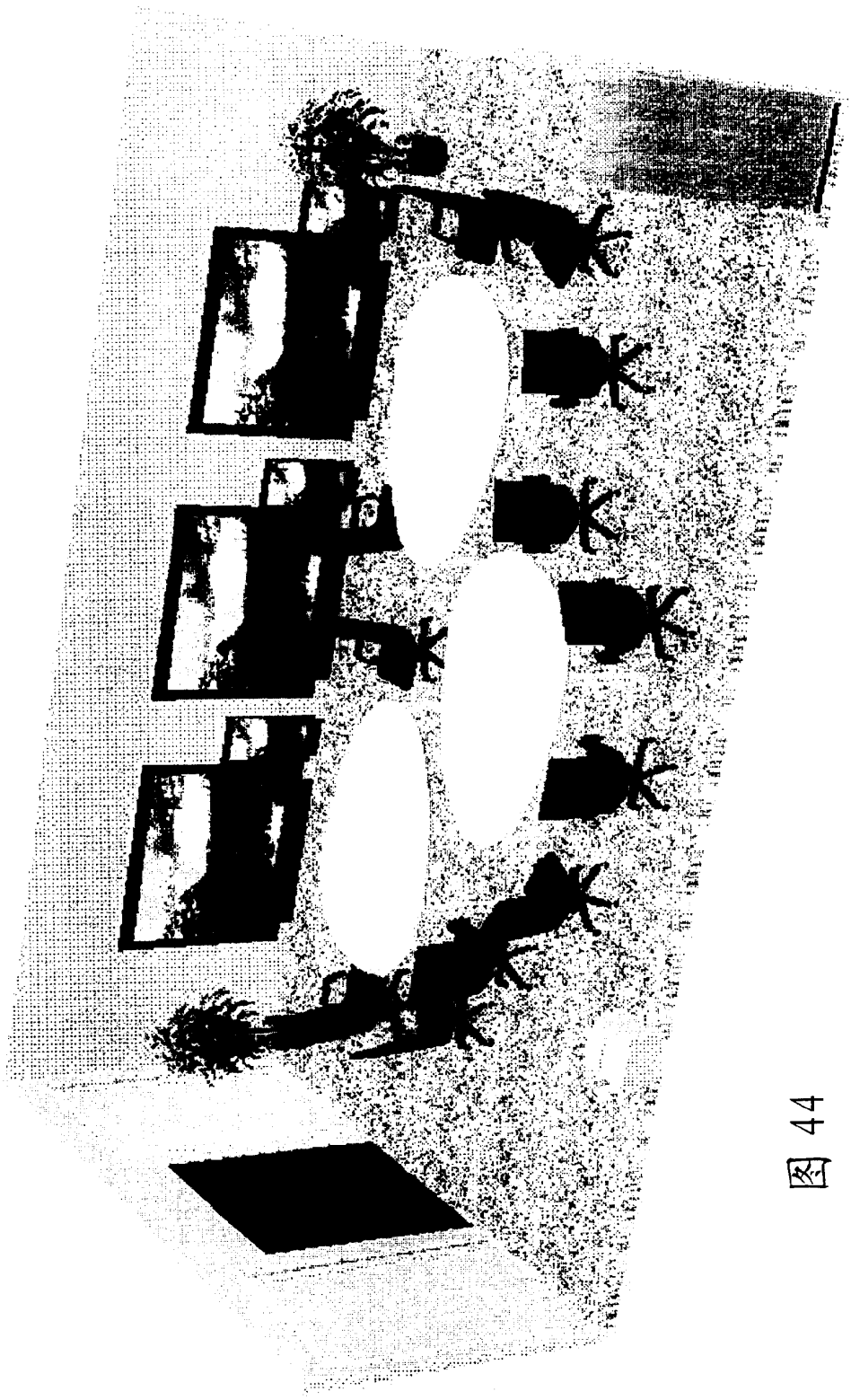


图 44

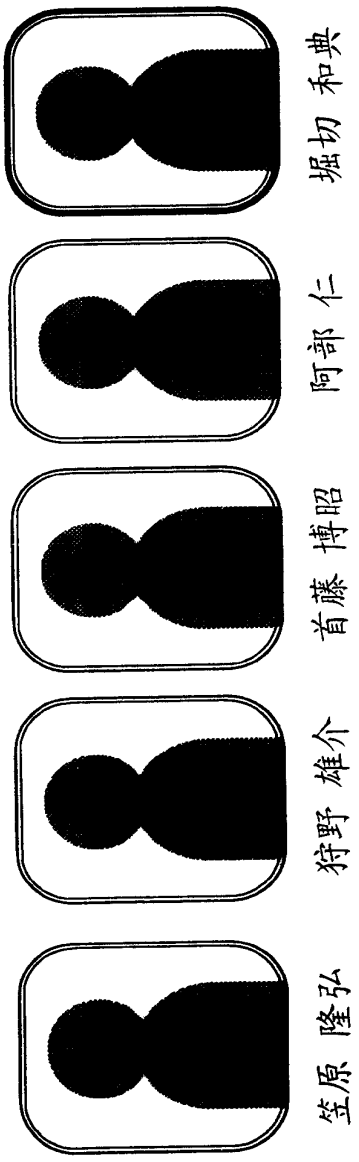


图 45

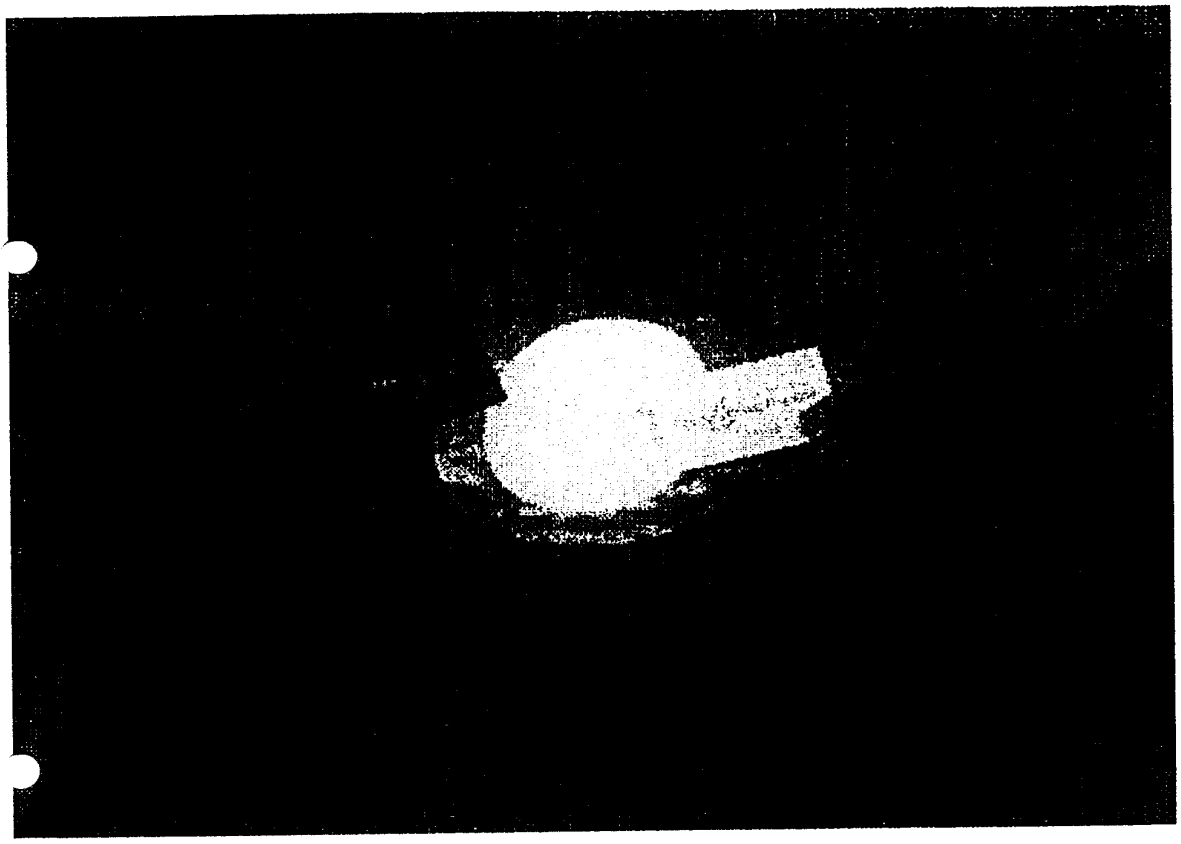


图 46

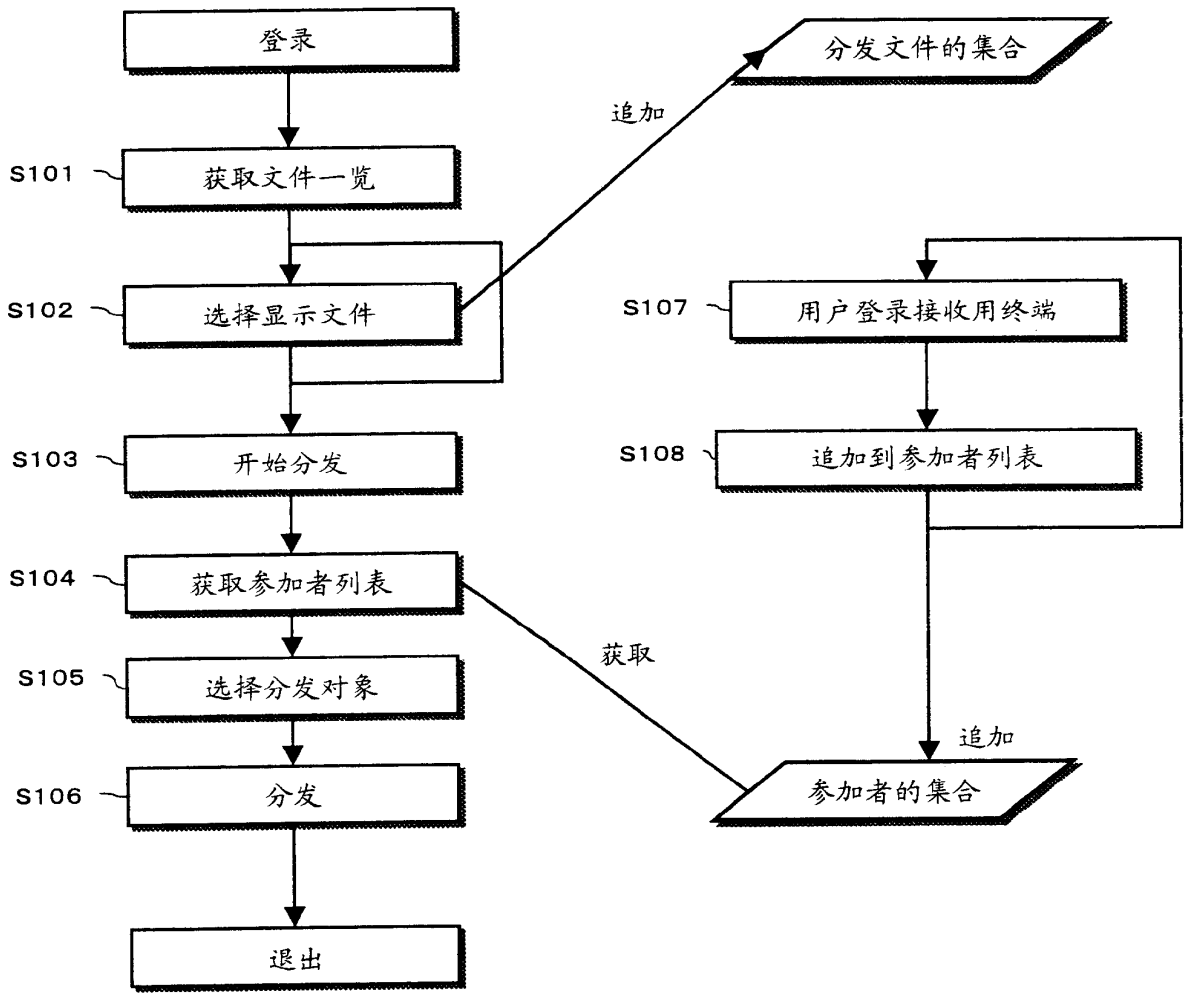

登录
S101
获取文件一览
S102
选择显示文件
S103
开始分发
S104
获取参加者列表
S105
选择分发对象
S106
分发
退出
追加
分发文件的集合
S107
用户登录接收用终端
S108
追加到参加者列表
获取
追加
参加者的集合

图 47

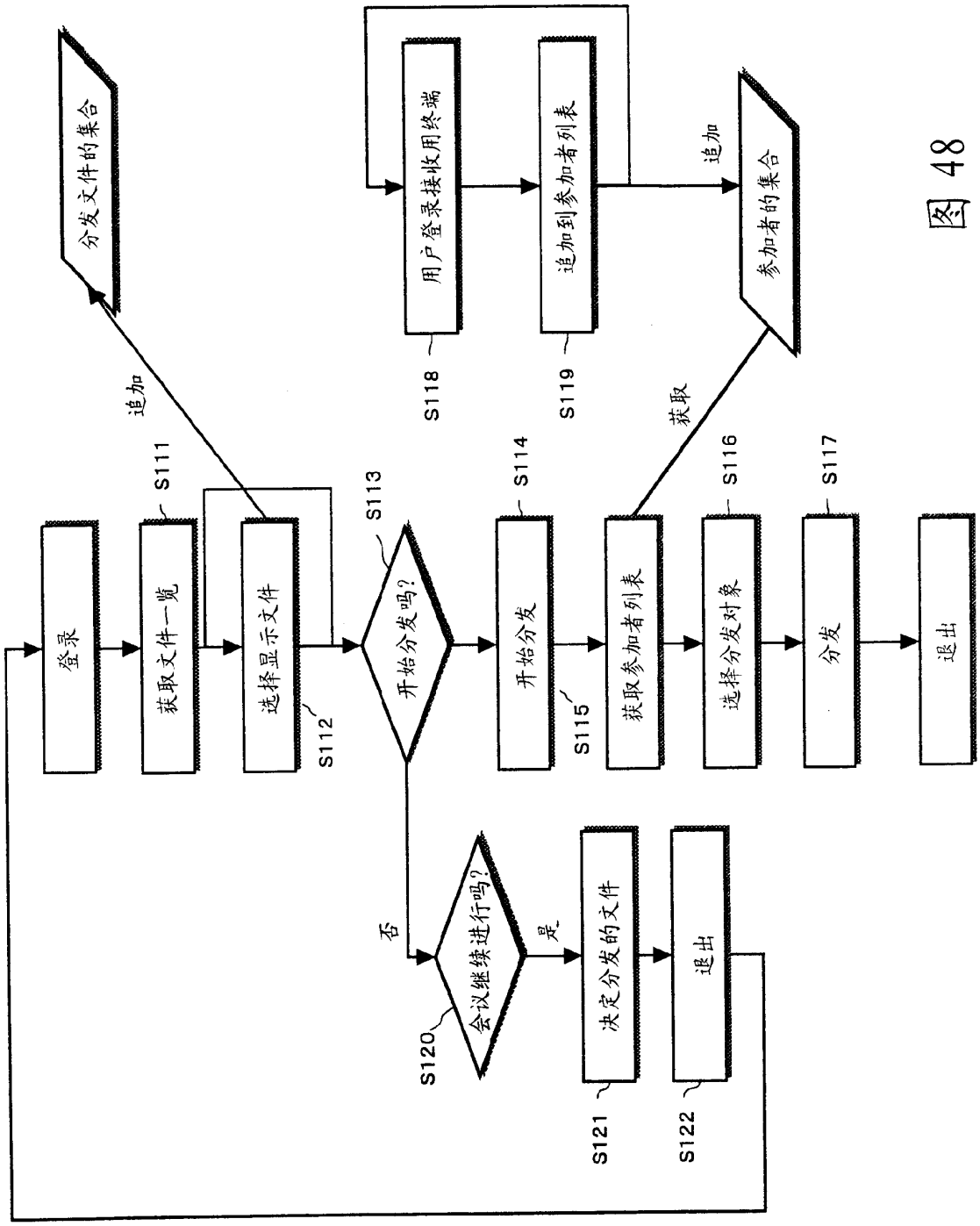

登录
获取文件一览
选择显示文件
开始分发吗?
开始分发
获取参加者列表
选择分发对象
分发
退出
会议继续进行吗?
决定分发的文件
退出
用户登录接收用终端
追加到参加者列表
参加者的集合
分发文件的集合
追加
获取
否
是
S111
S112
S113
S114
S115
S116
S117
S118
S119
S120
S121
S122

图 48

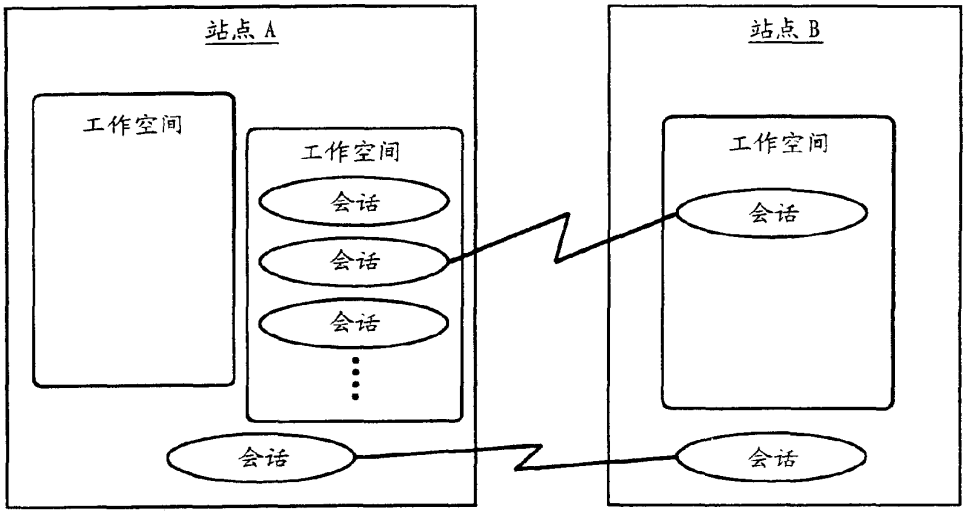

站点 A
工作空间
工作空间
会话
会话
会话
会话
站点 B
工作空间
会话
会话

图 49

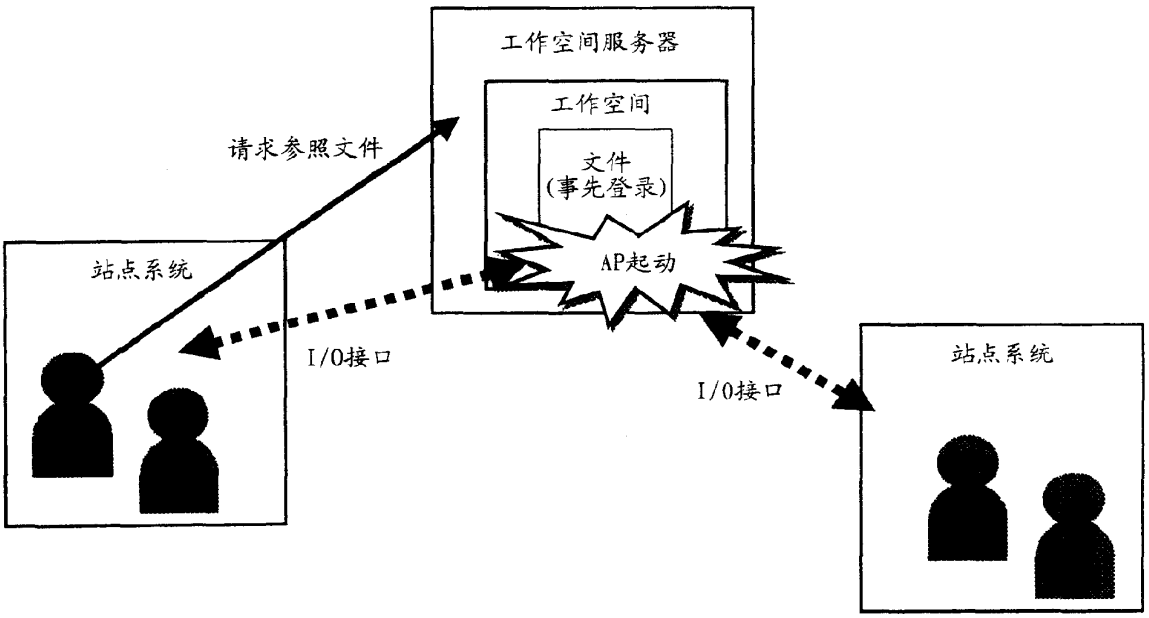

工作空间服务器
工作空间
文件
(事先登录)
AP起动
请求参照文件
站点系统
I/O接口
I/O接口
站点系统

图 50

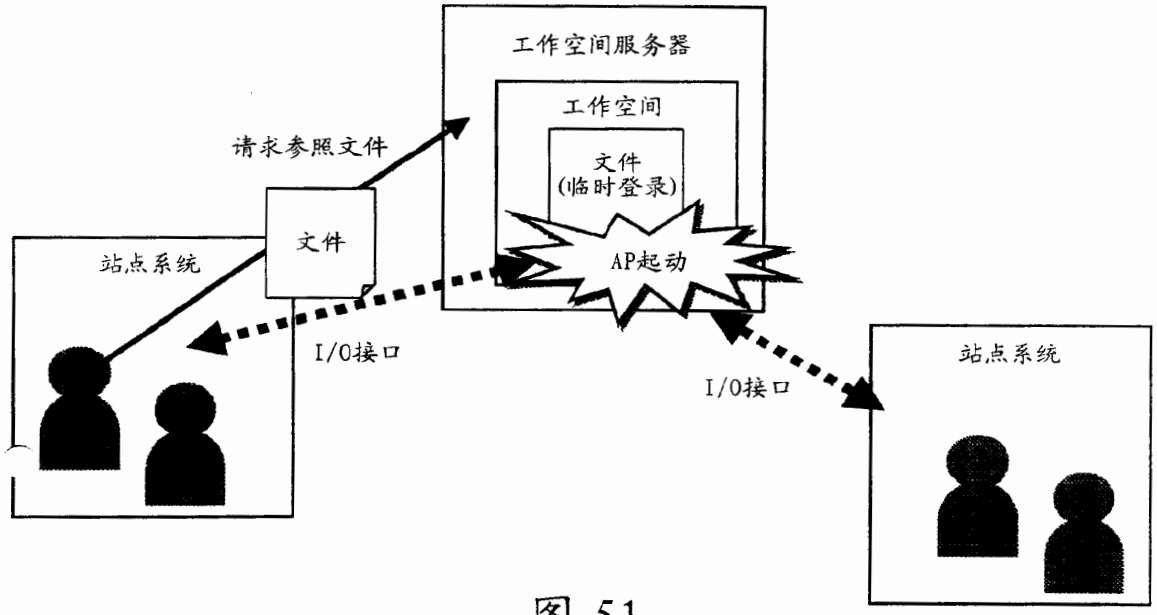

工作空间服务器
工作空间
文件
(临时登录)
请求参照文件
文件
站点系统
AP起动
I/O接口
I/O接口
站点系统

图 51

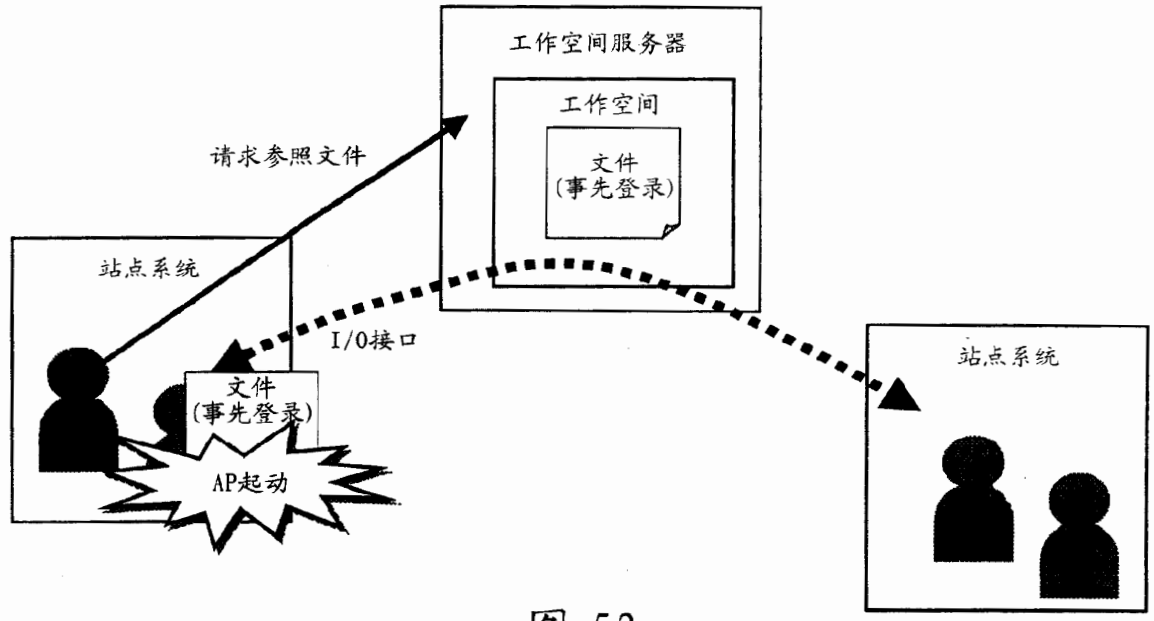

工作空间服务器
工作空间
文件
(事先登录)
请求参照文件
站点系统
I/O接口
文件
(事先登录)
AP起动
站点系统

图 52

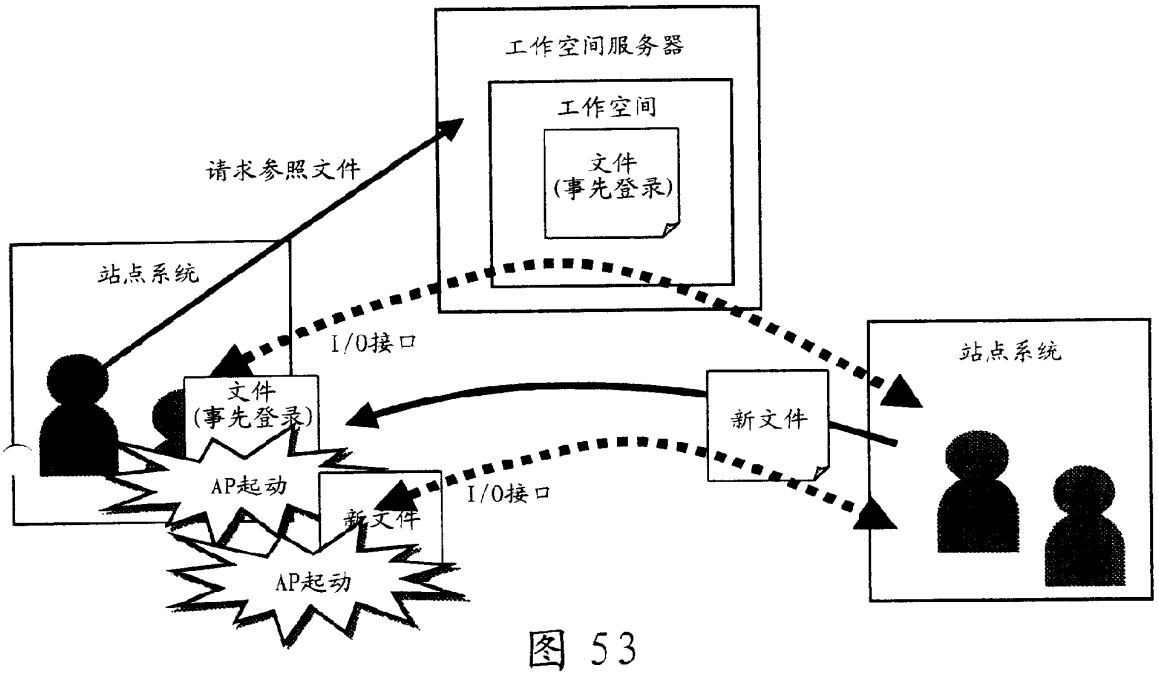

工作空间服务器
工作空间
文件
(事先登录)
请求参照文件
站点系统
I/O接口
文件
(事先登录)
AP起动
新文件
AP起动
新文件
I/O接口
站点系统

图 53

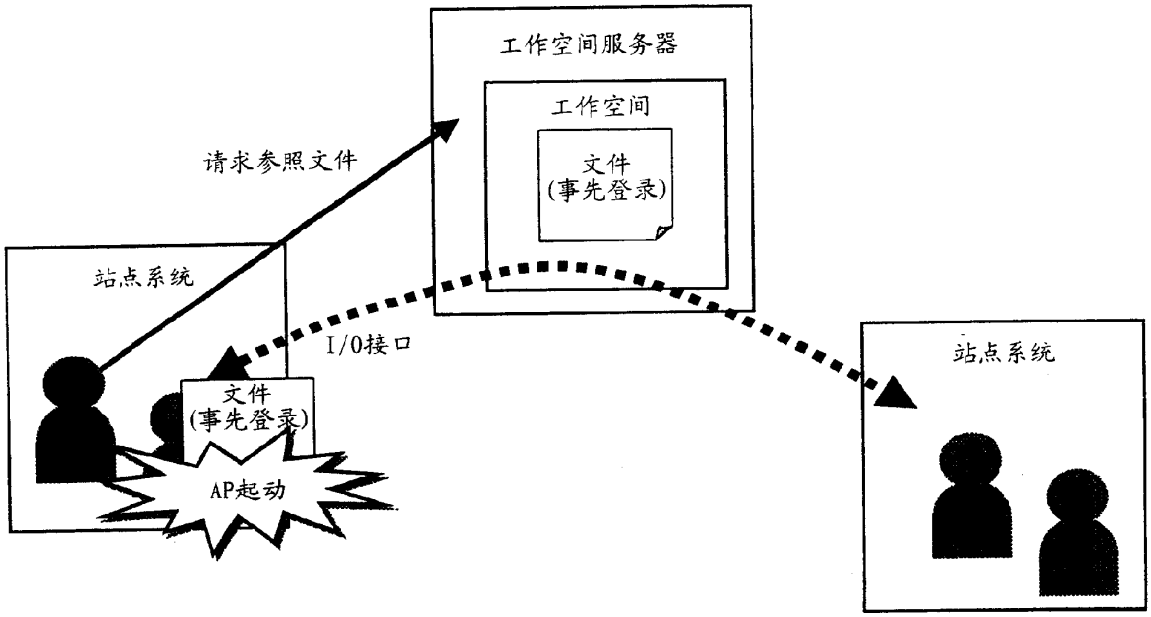

工作空间服务器
工作空间
文件
(事先登录)
请求参照文件
站点系统
I/O接口
文件
(事先登录)
AP起动
站点系统

图 54

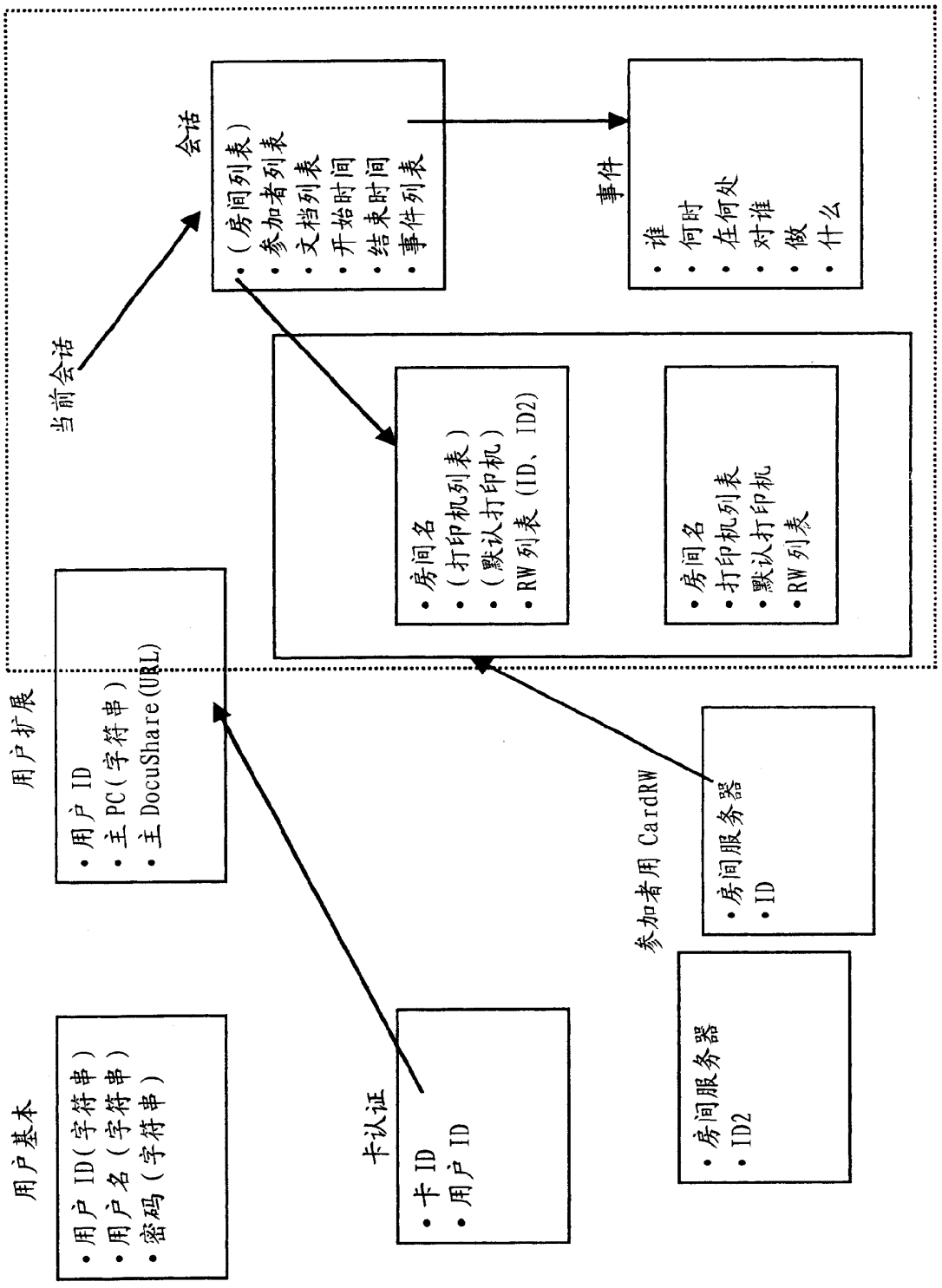

用户基本
• 用户 ID（字符串）
• 用户名（字符串）
• 密码（字符串）
卡认证
• 卡 ID
• 用户 ID
用户扩展
• 用户 ID
• 主 PC（字符串）
• 主 DocuShare（URL）
当前会话
会话
• （房间列表）
• 参加者列表
• 文档列表
• 开始时间
• 结束时间
• 事件列表
事件
• 谁
• 何时
• 在何处
• 对谁
• 做
• 什么
• 房间名
• （打印机列表）
• （默认打印机）
• RW 列表（ID、ID2）
• 房间名
• 打印机列表
• 默认打印机
• RW 列表
参加者用 CardRW
• 房间服务器
• ID
• 房间服务器
• ID2

图 55

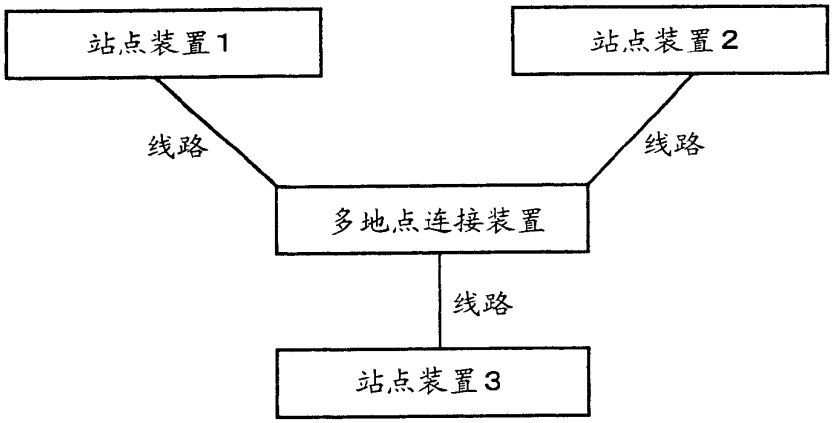


图 56

Espacenet

Bibliographic data: CN1788494 (A) — 2006-06-14

System and method for transmission of a multitude of video sequences

Inventor(s): HEROLD WENGER STEPHAN DR WILLI [US] ± (WENGER STEPHAN DR.,WILLIAMS HEROLD)

Applicant(s): TELESUIT CORP [US] ± (TELESUIT CORP)

Classification: - international: ***H04N7/15; H04N7/26; H04N7/50; H04N7/58***
- cooperative: **H04N19/124**; **H04N19/147**; **H04N19/152**; **H04N19/154**; **H04N19/162**; **H04N19/172**; **H04N19/196**; **H04N19/197**; **H04N19/198**; **H04N19/61**; **H04N21/2365**; **H04N21/23655**; **H04N21/4347**; **H04N7/152**

Application number: CN2004807440 20040220

Priority number(s): US20030371823 20030221

Also published as: WO2004077835 (A1) US2004179591 (A1) US7352809 (B2) JP2006520141 (A) EP1602238 (A1) more

Abstract not available for CN1788494 (A)
Abstract of corresponding document: WO2004077835 (A1)

A system and method for optimal transmission of a multitude of video pictures consisting of end video encoders wherein more than one encoder is utilized. The system and method improve the image quality of a broadband image comprised of a plurality of images by generating a new bit rate encoder based upon a prior bit rate as determined by a bit rate determiner, thereby managing the distribution of available bandwidth.

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[51] Int. Cl.
H04N 7/26 (2006.01)
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H04N 7/50 (2006.01)

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[74] 专利代理机构 中原信达知识产权代理有限责任公司
代理人 黄启行 谢丽娜

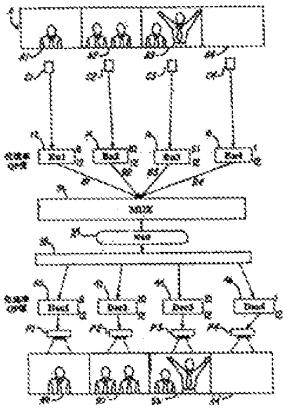
权利要求书 16 页 说明书 16 页 附图 11 页

[54] 发明名称

用于大量视频序列传输的系统和方法

[57] 摘要

一种用于大量视频画面的最佳传输的系统和方法，由终端视频编码器组成，其中使用了一个以上的编码器。该系统和方法通过基于由位速率确定装置确定的在前的位速率生成新的位速率，来改善由多个图像构成的宽带图像的图像质量，从而管理了可用带宽的分布。



1. 一种由多个视频编码器组成系统，所述视频编码器中的每一个有损地将视频画面的序列压缩成具有指定目标位速率的位流，该系统导致通过单独修改每一个编码器的所述目标位速率而加以最优化所达到的质量。

2. 如权利要求 1 所述的系统，其特征在于，所述所达到的画面质量的最优化是通过在所有编码器之间使所达到的画面质量均匀化而达到的。

3. 如权利要求 2 所述的系统，其特征在于，使用线性最优化来执行所述平均化。

4. 如权利要求 3 所述的系统，其特征在于，以固定时间间隔来执行所述均匀化。

5. 如权利要求 4 所述的系统，其特征在于，所述固定时间间隔是编码帧速率或它的整数倍。

6. 如权利要求 3 所述的系统，其特征在于，以可变时间间隔来执行所述均匀化。

7. 如权利要求 6 所述的系统，其特征在于，所述可变时间间隔是由通过用户界面的输入确定的。

8. 如权利要求 4 所述的系统，其特征在于，使用在所述时间间隔内编码的所有画面中的所有宏块的平均量化器参数作为测量所述所达到的质量的工具。

9. 如权利要求 6 所述的系统，其特征在于，使用在所述时间间隔内编码的所有画面中的所有宏块的平均量化器参数作为测量所述所达到的质量的工具。

10. 如权利要求 4 所述的系统，其特征在于，使用在所述时间间隔内所有未编码的源画面与所有生成的参考画面之间计算的峰值信噪比（PSNR）作为测量所述所达到的质量的工具。

11. 如权利要求 6 所述的系统，其特征在于，使用在所述时间间隔内所有未编码的源画面与所有生成的参考画面之间计算的峰值信噪比（PSNR）作为测量所述所达到的质量的工具。

12. 如权利要求 4 所述的系统，其特征在于，使用在所述时间间隔内所有未编码的源画面与所有生成的参考画面之间计算的平方误差和（SSD）作为测量所述所达到的质量的工具。

13. 如权利要求 6 所述的系统，其特征在于，使用在所述时间间隔内所有未编码的源画面与所有生成的参考画面之间计算的平方误差和（SSD）作为测量所述所达到的质量的工具。

14. 如权利要求 4 所述的系统，其特征在于，使用在所述时间间隔内所有未编码的源画面与所有生成的参考画面之间计算的绝对误差和（SAD）作为测量所述所达到的质量的工具。

15. 如权利要求 6 所述的系统，其特征在于，使用在所述时间间隔内所有未编码的源画面与所有生成的参考画面之间计算的绝对误差和（SAD）作为测量所述所达到的质量的工具。

16. 如权利要求 1 所述的系统，其特征在于，基于每一个编码画面中的多个宏块修改每一个编码器的所述目标位速率，并且采用速率

控制机构，该机构是每一个编码器的主要部分。

17. 如权利要求 16 所述的系统，其特征在于，多个宏块是一个编码画面的所有宏块。

18. 如权利要求 8 所述的系统，其特征在于，基于每一个编码画面中的多个宏块修改每一个编码器的速率，并且采用速率控制机制，该机制是每一个编码器的必要部分。

19. 一种用于改善实时编码的视频应用的质量的方法，包括如下步骤：

使用目标位速率对在基本相同时间获得的第一多个图像进行编码；

针对所述第一多个图像分别测量多个编码器的多个实际位速率；

分别测量所述多个编码器中的每一个的多个失真值；以及

针对第二多个图像，分别计算要被所述多个编码器使用的多个经调节的目标位速率，从而使得用于对所述第二多个图像进行编码的所述多个编码器的第二多个失真值将会基本相同。

20. 如权利要求 19 所述的方法，其特征在于，针对失真值使用了峰值信噪比（PSNR）。

21. 如权利要求 19 所述的方法，其特征在于，针对失真值使用了绝对误差和（SAD）。

22. 如权利要求 19 所述的方法，其特征在于，针对失真值使用了平方误差和（SSD）。

23. 如权利要求 19 所述的方法，其特征在于，针对失真值使用了平均量化器参数（QP）作为启发式工具。

24. 如权利要求 19 所述的方法，其中，所述计算步骤还包括如下步骤：

确定所述第一多个图像的平均失真和所述第一多个图像中的一个的失真之间的差。

25. 如权利要求 24 所述的方法，其中，所述计算步骤还包括如下步骤：

通过函数 rate 对所述差进行加权，生成加权的失真；以及

对具有所述多个图像中的所述一个的位速率的加权的失真求和。

26. 如权利要求 25 所述的方法，其中使用下面的式子来确定所述多个经调节的位速率中的每一个：

$$R_{temp}(n) = R_{prev}(n) + rate(\frac{\sum_{i=0}^{n} D_{prev}(i)}{n} - D_{prev}(n))$$

以及

$$R(n) = T\frac{R_{temp}(n)}{\sum_{i=0}^{n} R_{temp}(n)}$$

。

27. 一种用于对包括多个子图像的所显示的图像进行最优化的方法，所述方法包括如下步骤：

使多个编码器按所有位流的组合位速率将多个子图像压缩成多个位流，从而使得所述多个编码器中的每一个的目标位速率得到最优化。

28. 如权利要求 27 所述的方法，其中，最优化所述目标位速率，从而使得对于所述多个编码器中的每一个来说，每一个子图像的失真是基本相同的。

29. 如权利要求 27 所述的方法，其中，所述方法还包括如下步骤：

以固定时间间隔执行所述使编码器操作的步骤。

30. 如权利要求 29 所述的方法，其中，所述固定时间间隔是帧距的整数倍。

31. 如权利要求 27 所述的方法，其中，所述方法还包括如下步骤：

以可变时间间隔执行所述使编码器操作的步骤。

32. 如权利要求 31 所述的方法，其中，所述方法还包括如下步骤：

使用绝对误差和、平方误差和或峰值信噪比中的至少一个来确定失真。

33. 如权利要求 28 所述的方法，其中，所述方法还包括如下步骤：

通过使用由所述多个摄影机捕获的所述第一多个图像的平均失真和所述第一多个图像中的一个的失真之间的差来确定所述失真。

34. 如权利要求 33 所述的方法，其中，所述计算步骤还包括如下步骤：

通过函数 rate 对所述差进行加权，生成加权的失真；以及

对具有所述第一多个图像中的所述一个的位速率的加权的失真求和。

35. 如权利要求 34 所述的方法，其中，使用下面的式子来确定所述多个经调节的位速率中的每一个：

$$R_{temp}(n) = R_{prev}(n) + rate(\frac{\sum_{i=0}^{n} D_{prev}(i)}{n} - D_{prev}(n))$$

$$R(n)=T\frac{R_{temp}(n)}{\sum_{i=0}^{n}R_{temp}(n)}$$ 。

36. 如权利要求 27 所述的方法，其中，所述编码器中的每一个包括所述位速率控制管理器。

37. 如权利要求 27 所述的方法，其中，所述位速率控制管理器通过使用简单网络管理协议的网络来控制所述多个编码器中的每一个。

38. 一种用于最佳地向一个或更多的目的地传输多个画面的方法，包括如下步骤：

提供多个编码器，所述编码器中的每一个包含一个速率控制算法，该算法调节由所述多个编码器中的每一个编码的画面的质量，致使编码画面的目标位速率不超过预定量；

分别使用所述多个编码器中的每一个来有损地压缩多个序列，所述序列具有多个目标位速率的多个位流，所述目标位速率导致多个所达到的质量，所述多个所达到的质量是通过测量所述多个所达到的质量，单独修改多个编码器中的每一个的多个目标位速率来加以最优化的；

通过以所有所述多个画面的所述多个质量基本相同的方式调节所述多个编码器中的每一个的目标位速率，来对由所述多个编码器编码的所有所述多个画面的质量进行最优化。

39. 如权利要求 38 所述的方法，其中，所述方法还包括如下步骤：

通过在所有编码器当中使画面质量均匀化，来对所有所述多个画面的质量进行最优化。

40. 如权利要求 39 所述的方法，其中，所述方法还包括如下步

骤：

使用线性最优化来执行所述均匀化。

41. 如权利要求 39 中所述的方法，其中，所述方法还包括如下步骤：

以固定时间间隔执行所述均匀化。

42. 如权利要求 41 所述的方法，其中，所述固定时间间隔是编码帧速率的倒数或它的整数倍数。

43. 如权利要求 39 所述的方法，其中，所述方法还包括如下步骤：

以可变时间间隔执行所述均匀化。

44. 如权利要求 43 所述的方法，其中，所述方法还包括如下步骤：

通过经由用户界面的输入来确定所述可变时间间隔。

45. 如权利要求 38 所述的方法，其中，所述方法还包括如下步骤：

使用前一间隔内编码的所有多个视频画面中的宏块的平均量化器参数，来测量所述多个所达到的质量。

46. 如权利要求 38 所述的方法，其中，所述方法还包括如下步骤：

使用在前一间隔内多个未编码的源画面与多个生成的参考画面之间计算的峰值信噪比（PSNR），来测量所述多个所达到的质量。

47. 如权利要求 38 所述的方法，其中，所述方法还包括如下步骤：

使用在前一间隔内多个未编码的源画面与多个生成的参考画面之间计算的平方误差和（SSD），测量所述多个所达到的质量。

48. 如权利要求 38 所述的方法，其中，所述方法还包括如下步骤：

使用在前一间隔内多个未编码的源画面与多个生成的参考画面之间计算的绝对误差和（SAD），测量所述多个所达到的质量。

49. 如权利要求 38 所述的方法，其中，所述多个编码器中的每一个的目标位速率是使用每一个相应编码画面的多个宏块来进行修改的，因此，在一个画面间隔内被不止一次地确定。

50. 如权利要求 38 所述的方法，其中，由所述多个编码器编码的所述多个画面是一起构成一个时域内单个源图像的多个子图像，并且所有组成所述单个源图像的子图像是同时被捕获的。

51. 如权利要求 38 所述的方法，其中，所述多个画面是定义单个源图像的多个子图像，并且所有所述子图像是空间相邻的。

52. 如权利要求 50 所述的方法，其中，所述多个画面是同时被捕获并且空间相邻的多个子图像。

53. 一种用于最佳地向一个或更多的目的地传输多个画面的系统，包括，

用于捕获多个画面的多个视频源，

多个编码器，所述多个编码器中的每一个遵循混合编码器的原理，采用速率控制，并能够报告在上一报告和给位速率控制管理器的请求之间的时间间隔内所达到的画面质量；以及

所述位速率控制管理器与所述多个编码器中的每一个相连，确定所述多个编码器中的每一个的目标位速率，其中所述位速率控制器确

定所述多个编码器中每一个的所述目标位速率，致使所有由所述多个编码器编码的画面的个体质量是以所有画面的所述所达到的质量基本相同的方式加以最优化的。

54. 如权利要求 53 所述的系统，其中，所述位速率控制管理器是分布式应用，并且构成每一编码器的必要部分。

55. 如权利要求 53 所述的系统，其中，所述位速率控制管理器是在所述多个编码器中的每一个的外部的设备。

56. 如权利要求 55 所述的系统，其中，所述位速率控制管理器通过适当通信链路以及来自多个编码器的协议来接收多个编码输入信息，并通过通信链路和协议将目标位速率发送到所述多个编码器。

57. 如权利要求 55 所述的系统，其中，所述通信链路是串行链路。

58. 如权利要求 55 所述的系统，其中，所述通信链路遵循规范 IEEE 802.x 或以太网(IEEE 802.3)中的一种。

59. 如权利要求 55 所述的系统，其中，所述协议是简单网络管理协议（RFC3416）。

60. 如权利要求 55 所述的系统，其中，所述位速率控制管理器通过在所有编码器中使画面质量均匀化来对所有所述多个画面的质量进行最优化。

61. 如权利要求 60 所述的系统，其中，所述位速率控制管理器使用线性最优化来执行所述均匀化。

62. 如权利要求 60 所述的系统，其中，所述位速率控制管理器以固定时间间隔执行所述均匀化。

63. 如权利要求 62 所述的系统，其中，所述固定时间间隔是所述多个画面的帧速率的倒数或它的整数倍。

64. 如权利要求 60 所述的系统，其中，所述位速率控制管理器以可变时间间隔执行所述均匀化。

65. 如权利要求 64 所述的系统，其中，所述位速率控制管理器通过经由用户界面的输入来确定所述可变时间间隔。

66. 如权利要求 53 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内编码的所有多个视频画面内的所有宏块的平均量化器参数来测量所述多个所达到的质量。

67. 如权利要求 53 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内多个未编码的源画面和多个生成的参考画面之间计算的峰值信噪比（PSNR）来测量所述多个所达到的质量。

68. 如权利要求 53 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内多个未编码的源画面和多个生成的参考画面之间计算的平方误差和（SSD）来测量所述多个所达到的质量。

69. 如权利要求 53 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内多个未编码的源画面和多个生成的参考画面之间计算的绝对误差和（SAD）来测量所述多个所达到的质量。

70. 如权利要求 53 所述的系统，其中，所述多个编码器中的每一个的所述目标位速率是使用每一个相应的编码画面的多个宏块来进

行修改的，并且在一个画面间隔内被不止一次地确定。

71. 如权利要求 53 所述的系统，其中，由所述多个编码器编码的所述多个画面是一起构成一个时域内的单个源图像的多个子图像，并且所有组成所述单个源图像的子图像是基本同时被捕获的。

72. 如权利要求 53 所述的系统，其中，所述多个画面是定义单个源图像的多个子图像，并且所有所述子图像是空间相邻的。

73. 如权利要求 70 所述的系统，其中，所述多个画面是同时被捕获并且空间相邻的多个子图像。

74. 如权利要求 53 所述的系统，其中，所述多个视频源以及多个编码器位于发送站内；所述系统还包括：

位于所述发送站内且与所述多个编码器相连的多路复用器，用于根据所述多个编码器生成的多个位流对单个多路复用位流进行多路复用；

数据链路，其将所述位流传送到单个接收站（点对点）中的多路分离器或到多个接收站（多点，或广播），

每一个接收站内的多路分离器，其从多路复用位流无损地重建由所述多个编码器生成的多个位流，

所述至少一个接收站内的多个解码器，用于将所述多个位流重建为准备好在至少一个接收站上显示的多个重建的画面。

75. 如权利要求 74 所述的系统，其中，所述位速率控制管理器是分布式应用并且构成每一个编码器的必要部分。

76. 如权利要求 74 所述的系统，其中，所述位速控制管理器在所述多个编码器中的每一个的外部。

77. 如权利要求 76 所述的系统，其中，所述位速率控制管理器通过适当通信链路以及来自所述多个编码器的协议来接收多个编码输入信息，并通过通信链路和协议将目标位速率发送到所述多个编码器。

78. 如权利要求 76 所述的系统，其中，所述通信链路是串行链路。

79. 如权利要求 76 所述的系统，其中，所述通信链路遵循规范 IEEE 802.x 或以太网 (IEEE 802.3)中的一种。

80. 如权利要求 76 所述的系统，其中，所述协议是简单网络管理协议（RFC3416）。

81. 如权利要求 76 所述的系统，其中，所述位速率控制管理器通过在所有编码器中使画面质量均匀化来对所有所述多个画面的质量进行最优化。

82. 一种视频会议系统，包括：

第一站内的多个摄影机，捕获空间相邻的场景，

编码系统，分别压缩、传输和解压缩来自所述多个摄影机的多个画面，并在至少一个接收站内生成多个重建的画面；

所述编码系统包括与所述多个编码器中的每一个相连的位速率控制管理器，该管理器用于确定所述多个编码器中每一个的位速率，从而使得由所述多个编码器中的每一个生成的再生位流的质量基本相同；

接收站内的多个显示设备，它们的显示区是空间相邻的，致使它们能够渲染在发送站捕获的场景。

83. 如权利要求 82 所述的系统，其中，所述位速率控制管理器

使用线性最优化来执行所述均匀化。

84. 如权利要求 82 所述的系统，其中，所述位速率控制管理器以固定时间间隔执行所述均匀化。

85. 如权利要求 84 所述的系统，其中，所述固定时间间隔是所述多个画面的帧速率的倒数或它的整数倍。

86. 如权利要求 82 所述的系统，其中，所述位速率控制管理器以可变时间间隔执行所述均匀化。

87. 如权利要求 86 所述的系统，其中，所述位速率控制管理器通过经由用户界面的输入来确定所述可变时间间隔。

88. 如权利要求 82 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内编码的所有所述多个视频画面中的所有宏块的平均量化器参数来测量所述多个所达到的质量。

89. 如权利要求 82 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内多个未编码的源画面和多个生成的参考画面之间计算的峰值信噪比（PSNR）来测量所述多个所达到的质量。

90. 如权利要求 82 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内多个未编码的源画面和多个生成的参考画面之间计算的平方误差和（SSD）来测量所述多个所达到的质量。

91. 如权利要求 82 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内多个未编码的源画面和多个生成的参考画面之间计算的绝对误差和（SAD）来测量所述多个所达到的质量。

92. 如权利要求 82 所述的系统，其中，所述多个编码器中的每一个的所述目标位速率是使用每一个相应的编码画面的多个宏块来进行修改的，并且在一个画面间隔内被不止一次地确定。

93. 如权利要求 82 所述的系统，其中，由所述多个编码器编码的所述多个画面是一起构成一个时域内的单个源图像的多个子图像，并且所有组成所述单个源图像的子图像是基本同时被捕获的。

94. 如权利要求 82 所述的系统，其中，所述多个画面是定义单个源图像的多个子图像，并且所有所述子图像是空间相邻的。

95. 如权利要求 92 所述的系统，其中，所述多个画面是同时被捕获并且空间相邻的多个子图像。

96. 如权利要求 82 所述的系统，其中，所述位速率控制管理器是分布式应用，并且构成每一个编码器的必要部分。

97. 如权利要求 82 所述的系统，其中，所述位速控制管理器在所述多个编码器中的每一个的外部。

98. 如权利要求 97 所述的系统，其中，所述位速率控制管理器通过适当通信链路以及来自所述多个编码器的协议来接收多个编码输入信息，并通过通信链路和协议将目标位速率发送到所述多个编码器。

99. 如权利要求 97 所述的系统，其中，所述通信链路是串行链路。

100. 如权利要求 97 所述的系统，其中，所述通信链路遵循规范 IEEE 802.x 或以太网 (IEEE 802.3)中的一种。

101. 如权利要求 97 所述的系统，其中，所述协议是简单网络管理协议（RFC3416）。

102. 如权利要求 97 所述的系统，其中，所述位速率控制管理器通过在所有编码器中使画面质量均匀化来对所有所述多个画面的质量进行最优化。

103. 如权利要求 102 所述的系统，其中，所述位速率控制管理器使用线性最优化来执行所述均匀化。

104. 如权利要求 97 所述的系统，其中，所述位速率控制管理器以固定时间间隔执行所述均匀化。

105. 如权利要求 104 所述的系统，其中，所述固定时间间隔是所述多个画面的帧速率的倒数或它的整数倍。

106. 如权利要求 102 所述的系统，其中，所述位速率控制管理器以可变时间间隔执行所述均匀化。

107. 如权利要求 106 所述的系统，其中，所述位速率控制管理器通过经由用户界面的输入来确定所述可变时间间隔。

108. 如权利要求 82 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内编码的所有所述多个视频画面中的所有宏块的平均量化器参数来测量所述多个所达到的质量。

109. 如权利要求 82 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内多个未编码的源画面和多个生成的参考画面之间计算的峰值信噪比（PSNR）来测量所述多个所达到的质量。

110. 如权利要求 82 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内多个未编码的源画面和多个生成的参考画面之间计算的平方误差和（SSD）来测量所述多个所达到的质量。

111. 如权利要求 82 所述的系统，其中，所述位速率控制管理器使用在所述时间间隔内多个未编码的源画面和多个生成的参考画面之间计算的绝对误差和（SAD）来测量所述多个所达到的质量。

112. 如权利要求 82 所述的系统，其中，所述多个编码器中的每一个的所述目标位速率是使用每一个相应的编码画面的多个宏块来进行修改的，并且在一个画面间隔内被不止一次地确定。

113. 如权利要求 82 所述的系统，其中，由所述多个编码器编码的所述多个画面是一起构成一个时域内的单个源图像的多个子图像，并且所有组成所述单个源图像的子图像是基本同时被捕获的。

114. 如权利要求 82 所述的系统，其中，所述多个画面是定义单个源图像的多个子图像，并且所有所述子图像是空间相邻的。

115. 如权利要求 92 所述的系统，其中，所述多个画面是同时被捕获并且空间相邻的多个子图像。

用于大量视频序列传输的系统和方法

技术领域

本发明涉及压缩视频信号的传输，并且更具体而言，涉及系统中编码位速率的最佳确定，在该系统中一个以上的编码视频流是通过单个、带宽有限的数据链路来进行多路复合的。

背景技术

试图在实时约束下达到重建视频图像的优良的感知质量的方法和系统通称为速率控制算法。传统速率控制算法在单个视频编码进程中起作用，且仅就单个编码视频流进行最优化。与此对比，本发明涉及同时对多个编码视频流进行最优化的算法。这类算法叫做多通道速率控制算法（MCRC 算法）。

两种主要类型的单通道速率控制算法也是大家知道的。第一类叫做固定位速率控制算法（CBR）。CBR 算法试图在编码进程期间将明确数目的位分配给每一所捕获的图像。第二类被称为可变位速率控制算法（VBR）。VBR 算法针对几个图像将位速率保持在平均水平且在明确的方差、常数之内。但是，它们考虑了每单个画面的间或显著改变。这使得编码器能够通过为大改变花费比为小改变所花费的更多的位，而对图像特性上的大改变作出反应，因此常常导致更好感知的画面质量。可以在出版物 IEE Transactions of Comm. Systems, 卷 3, 26-40 页,1963，Huang, Schultheiss 的"Block Quantization of Correlated Gaussian Random Variables"找到一个很早的位速率控制算法的实例。在 IEEE Trans. Circuits and Systems for Video Tech. 6 (1) (1996 年 2 月) 12-20 页，W. Ding 和 B. Liu 的"Rate Control Of MPEG Video Coding And Recording By Rate-Quantization Modeling"中描述了更新的 CBR 的实例，在 ISO-IEC/JTC1/SC29/WG11, MPEG2 Test model 5 Draft (1993 年

4 月)中描述了 VBR。

CBR 算法一般说来对于在固定带宽链路上的低延迟操作来说是优选的。在混合编码器中实现 CBR 算法的常见方式是调节量化步长，通常称为 QP 值。这个数值通过在压缩过程中改变（remove）变换系数舍入中的精度而直接影响压缩系数。在大多数视频压缩系统中（至少在遵照流行视频压缩标准之一的那些系统中），QP 值是宏块的属性并且典型地具有在诸如一至三十二的小数值编号范围内的整型数值。在这方面，QP 值越高，画面的质量就越低，而 QP 值越低画面质量就越高。因此，QP 值一般说来与画面质量成反比。

众所周知，人类视觉系统不适宜对画面质量方面的急剧变化作出反应，上述变化被感觉为非常讨厌的。因此，大多数速率控制算法都试图对于整个画面使用相等的 QP 值，或仅仅允许 QP 值的微小变化，由此使得画面质量平均，因此防止了急剧的质量变化。更完善的速率控制算法有时考虑心理光学（psycho-optical）因素，并区分画面的“平淡”和“活动”部分。然后它们试图以比活动部分要低的质量来对平淡部分进行编码。上述算法的典型实例可以在欧洲专利参考资料 EP 1 250 012 A2 中找到。

在某种程度上与本发明相关的另一种技术称为负载均衡。一般而言，负载均衡技术试图以最优化对请求的响应时间的方式将多个请求分配给多个服务器。它们最普通的是用在数据传输环境中，例如，将对一个受欢迎的站点的请求的负载分发给大量网络服务器。负载均衡算法通常使用线性最优化来在多个网络服务器当中对数据传输进行最优化，但是这些线性最优化技术没有提供针对来自视频会议环境的多个流的速率控制。

图 11 描绘了一种典型的现有技术，称为 TeleSuite®会议室的四屏幕视频会议系统和环境，其由俄亥俄州英格伍德的 TeleSuite 公司持

有，并具有编号为 5,572,248、5,751,337、6,160,573 以及 6,445,405 的美国专利中所显示并描述的类型，上述专利文件被结合于此作为参考并构成本文的一部分。

长宽比为 16：3 的宽带场景 A 包括四个空间相邻的子场景 A1、A2、A3 和 A4。许多先前的系统采用了通常遵照普遍接受的视频压缩标准，诸如国际电信同盟(ITU)标准 H.261 或 H.263 的视频压缩算法。例如，H-261 标准是为是 64 千字节/秒的倍数的数据速率而设计的。这样的标准常常具有既定的数据速率和优选的画面格式，尽管它们也许也支持其它格式，但是被广泛采用的编码器/解码器（编解码器）仅支持那些标准格式。因此，有必要结合几个摄影机和几个编解码器来捕获宽带场景，并通过空间地将它拆分成几个子场景而对该宽带场景进行编码，每一个子场景具有普遍支持的视频编解码器的画面格式之一的尺寸。

参考图 11，注意到每一个子场景是通过关联的摄影机 C1、C2、C3 和 C4 来捕获的。所示的实例中的子场景被描述如下：A1 示出了单个坐着的人的上身，A2 示出了两个坐着的人的上身，A3 示出了两个坐着的人的上身，其中一个人处于站起来并打手势的过程中，而 A4 示出了静止背景。

通过视频编码器 E1 至 E4 将各自携带子场景 A1 至 A4 的模拟表示的摄影机 C1 至 C4 的视频输出分别转换成压缩的、数字视频位流 B1 至 B4，优选的是遵照 ITU 视频压缩标准之一，诸如 H.261 或 H263。在一个环境中，所有编码器 E1 至 E4（在图 11 标记为 F-I）都被配置成采用相同位速率，即图 11 中所示实例中的 10k 比特/s。因此，经由局域网或广域网（WAN）的传输中使用的最后所得到的位速率是 4×10k 比特/s。由于子场景在它们的活动性方面不同，编码器位速率却是不变的，所以由 QP 值指示的所编码的子场景的质量也不同。对适度活动的子场景进行编码的编码器 E1，以 QP 值为 10 的好的质量水平

操作。与 E1 相比负责稍微更活动些子场景的编码器 E2，不能在相同位速率约束之内达到相同的质量，而是以 QP 值 12 操作的。对非常活动的子场景 A3 进行编码的编码器 E3 以 QP 值 30 操作，并且生成很低质量的编码图像。对静止背景子场景 A4 进行编码的编码器 E4 以 QP 为 1 的优良质量水平操作。

所有流都在多路复用单元 J 中多路复用在一起，以形成输出数据流。数据流被经由局域网或广域网（WAN）K 传送到接收房间。在这里，通过多路信号分离器 L 来对所接收的经多路复用的数据流进行多路信号分离，以重建原始的四个压缩的、数字视频位流。所述位流被传送到解码器 D1 至 D4，每一个解码器重建一个视频子图像。使用所附显示器或数据投影机 P1 至 P4 来使这些子图像可见。所有投影机 P1 至 P4 的投影机光束方向是这样安排的，四个所显示的子图像 I1 至 I4 空间地组成在几何学上像所捕获的场景 A 的完整图像 I。

每一个编码器 E1 至 E4 都具有一组规定的且固定的参数，并且依从这些参数生成位流。这些参数中最重要的是目标位流。典型地，在对所捕获的场景进行编码的时候，每一个编码器 E1 至 E4 都使用 CBR 算法来达到优良画面质量。当使用若干编码器的时候，各编码器以预定的位速率操作。正常的是将所有编码器都配置成使用相同的位速率，因为在配置的时候，还不知道要捕获的子场景的特性。

由于每一个子场景的位速率是固定的，所以编码子画面的质量水平随摄影机所捕获的活动性而变化。静止背景，例如子场景 A4 的静止背景，为了采用所配置的位速率，是以很高的质量编码的。非常活动的子场景，例如子场景 A3，产生不适宜地低的画面质量。在传输和重建之后，完整的宽带图像 I 不仅受使人厌恶地低的质量子图像 I3 之苦，还受子图像 I3 和 I4 之间的讨厌的质量变化之苦。

在显示由多个并排显示的子图像构成的宽带图像的时候，所希望

的是所显示的图像是相同质量的，因此它们不会由于急剧质量变化而使人的视觉系统烦恼。但是，当在房间内传输并显示大量图像的时候，如果所有传输的图像都使用相同的传输带宽（像现有技术中常见的那样），那么所显示的图像中的一个或多个将以和相邻子画面相比不同的质量水平来加以编码（通过使用不同的平均 QP 值）是罕见的。

因此所需要的是这样的系统和方法，跨多个子画面同时且实时地调节图像质量，以便跨由多个子图像构成的整个合成或宽带图像达到对于查看组成该图像的多个子图像的人来说高的感知图像质量。

还需要的是调节多个图像中的每一个的画面质量的系统和方法，其包括画面并且分发或均衡多个图像的传输，以便在视频传输系统中对总的画面质量进行最优化。

发明内容

有利地，为大量视频画面的最佳传输提供一种系统和方法，由 n 个视频编码器 E（n）组成，在这里 n 大于一，上述编码器将进来的画面转换为构成进来的画面的编码表示的比特序列，从而压缩它们，所述进来的画面优选的是来自诸如摄影机此类的视频源，且优选的是以固定的画面速率进行转换。每一个画面被当作独立的位流来传输。该压缩不是无损的，优选的是遵循混合编码器的原理。每一个视频编码器 E（n）都能够在任何指定时间将失真报告为 D（n），该失真是由有损压缩产生的。D (n) 可以峰值信噪比(PSNR)、平方误差和（SSD）、绝对误差和（SAD）的形式或其它适当方式来加以计算。D (n)也可以启发式（heuristically）地加以确定，例如通过将编码视频的平均量化因子（quantizer factor）用作质量指示。每一个视频编码器 E（n）还能够保持乘以画面速率后的每一个编码画面的比特的数目低于外部提供的最大比特数目，位速率 R(n)。整个由 n 个编码器 E（n）组成的系统还受最大目标位速率 T 的约束，因此 $T \geq \Sigma R(n)$。也就是说，在任何指定时间点上，目标位速率 T 都必须不大于所有编码器位速率

R（n）的总和。以使所有编码器的失真 D（n）都均等的方式，所述用于大量视频画面的最佳传输的系统以固定时间间隔（例如帧距的整数倍）、可变时间间隔（例如，每当可获得足够的处理能力的时候)或以由用户界面的输入引发的方式来调节每一个编码器的编码器位速率 R（n）。它通过执行 R(n)的线性最优化来这样做。

在一方面，这个发明包括一个由多个视频编码器组成并导致所达到的质量的系统，其中，每一个视频编码器有损地将视频画面序列压缩成具有指定速率的位流，所达到的质量是通过单独修改每一个编码器的目标位速率而加以最优化的。

在另一方面，这个发明包括一种用于改善实时编码的视频应用的质量的方法，包括如下步骤：使用目标位速率对在基本相同时间获得的第一多个图像进行编码，针对第一多个图像分别测量多个编码器的多个实际位速率，分别测量所述多个编码器中的每一个的多个失真值，以及针对第二多个图像，分别计算要由所述多个编码器使用的多个经调节的目标位速率，从而使得用来对第二多个图像进行编码的所述多个编码器的第二多个失真值将会基本相同。

在再另一方面，本发明包括一种用于最佳地向一个或更多目的地传输多个画面的方法，该方法包括如下步骤：提供多个编码器，每一个编码器包含一个速率控制算法，该算法调节由所述多个编码器中的每一个编码的画面的质量，以便编码画面的目标位速率不超过预定量；分别使用多个编码器中的每一个来有损地压缩多个序列，该序列具有多个目标位速率的多个位流，该目标位速率导致多个所达到的质量，所述多个所达到的质量是通过测量所述多个所达到的质量，单独修改多个编码器中的每一个的多个目标位速率来加以最优化的；通过以所有所述多个画面的所述多个质量基本相同的方式调节所述多个编码器中的每一个的目标位速率，来对所有由所述多个编码器编码的所述多个画面的质量进行最优化。

在另一个方面，本发明包括一种用于最佳地向一个或更多的目的地传输多个画面的系统，包括：多个用于捕获多个画面的视频源；多个编码器，每一个编码器遵循混合编码器的原理，采用速率控制，并能够报告在上一报告和给位速率控制管理器的请求之间的时间间隔内所达到的画面质量；以及确定所述多个编码器中的每一个的目标位速率的所述位速率控制管理器，该管理器是与所述多个编码器中的每一个相连的，其中所述位速率控制器确定多个编码器中每一个的所述目标位速率，致使所有由所述多个编码器编码的画面的个体质量是以所有画面的所述所达到的质量基本相同的方式来加以最优化的。

在再另一方面，本发明包括一种视频会议系统，包括，第一站内的多个摄影机，捕获空间相邻的场景；编码系统，分别压缩、传输和解压缩来自所述多个摄影机的多个画面，并在至少一个接收站内生成多个重建的画面，所述编码系统包括与所述多个编码器中的每一个相连的位速率控制管理器，该管理器用于确定所述多个编码器中每一个的位速率，从而使得由所述多个编码器中的每一个生成的再生位流的质量基本相同；接收站内的多个显示设备，它们的显示区是空间相邻的，以致它们能够渲染在发送站捕获的场景。

根据下面的描述、附图以及所附权利要求，该发明的其它目标和优点将显而易见。

附图说明

图 1 是示出本发明的一个实施例的示意图；

图 2 是第一站的另一示意图；

图 3 是第二或远程站的示意图；

图 4 是根据该发明的一个实施例的位速率控制管理器的示意图；

图 5 是根据该发明的一个方面的处理的流程图；

图 6 是示出本发明的进一步特征的图；

图 7 是另一个示出第一组位速率和量化值的图；

图 8 是与图 7 相似的图，除了在时间上较后示出了另一具有在采用本发明的特征之后的位速率和量化值的帧；

图 9 是本发明的另一个实施例的图；

图 10 是示出速率失真曲线的图；以及

图 11 是现有技术的系统的图，示出了导致差质量的图像的变化的量化尺寸（quantization size）。

具体实施方式

优选的是该发明被用作高质量视频会议系统的一部分，但是也可以有其它应用（例如用于很高分辨率的视频的画面编码的并行化和分割）。一个典型的系统在编号为 5,751,337、5,751,337、6,160,573 以及 6,445,405 的美国专利中示出了，上述专利被转让给了与本发明相同的受让人，并且被结合于此作为参考并构成本文的一部分。

参考图 1 到 10，示出了举例说明本发明的系统和方法。与现有技术形成对比的是，本系统和方法最佳地调节位速率和 QP 值。为了方便举例说明，WAN 位速率将会假定为 40k 比特/s，但要是希望的话它可以是另一速率，只要该速率至少与编码器 En1-En4 的位速率一样大，编码器 En1-En4 被分别标记为 12-18。正如稍后详细描述的，调节子场景中的每一个的位速率，致使作为结果的平均 QP 对于所有四个编码器来说都是同样的。但是，注意，在该例子中位速率是显著不同的。在图 1 中编码器 E1 使用 8k 比特/s 对它的适度活动的子场景进行编码。编码器 E2 使用稍微更活动些的子场景的 10k 比特/s。要以相同平均 QP 加以编码，编码器 E3 的非常活动的子场景要求 21k 比特/s，而编码器 E4 的静止背景仅要求 1k 比特/s。正如将要看到的，通过使用 MCRC 并利用作为结果的动态位速率分配，所有四个子场景都以相同平均 QP（在图 1 所述例子中的 12）加以编码，因此是在相同质量水平上的。除此之外，应该明白该发明允许多个编码器与彼此“交谈”，以及传送它们当前的质量或 QP 值，该值是由驻留在每一个编码器中

的内部 CBR 速率控制算法确定的。在这里稍后描述的本发明的一个实施例中，所有宏块的平均量化因数或 QP 值也被启发式地用作编码画面中的一个的质量的指示，该编码画面是通过 MCRC 算法来加以最优化的。注意，平均 QP 是通过对所有属于该编码画面的宏块的 QP 值求和，并用所述编码画面中的宏块的数量去除它来计算的。

图 2 到 3 是根据该发明的实施例的系统 10 的另一个例子，现在将会更详细地说明系统 10。在本实施例中，多个编码器 12、14、16 和 18 分别包括数字信号处理器（DSP）12a、14a、16a 和 18a。在正说明的实施例中，各 DSP 12a-18a 共享一个共用控制总线，诸如紧凑 PCI 总线此类的，该总线被用来在 DSP 12a-18a 之间和当中传送控制信息。

多个摄像机 C1、C2、C3 和 C4 分别捕获个体图像 20、22、24 和 26，并将与图像 20-26 关联的数据发送到编码器(En1-En4)12-18。所述用于视频图像的传输的方法可以借助于模拟或数字连接。DSP 12a-18a 每一个包括位速率控制管理器进程(BCM)，在图 2 中被示意性地示作框 30，该进程分别接收每一个编码器 En1-En4 的 QP 值以及由摄像机 C1-C4 捕获的每一个图像的实际位速率，并以这里稍后描述的方式生成每一个编码器的新的位速率。然后用多路复用器 32 对所述位流（具有由 BCM 30 确定的位速率）进行多路复用，并经由广域网 34 将它们分发到远程站 36。

图 3 示出了接收或远程站 36。多路复用的信号是经由网络 34 接收的，并且是由多路信号分离器 38 接收的，在该例子中，多路信号分离器 38 将信号多路分离成四个位流。所述四个位流是分别由多个解码器 DEC1 40、DEC2 42、DEC3 44 以及 DEC4 46 接收的，上述解码器各具有关联的数字信号处理器 40a、42a、44a 和 46a。为了方便举例说明以及理解，该发明被描述为使用编码器 En1-En4 12-18 以及解码器 DEC1-DEC4 40-46，但是应该理解可以使用更少或更多数目，

倘若存在不止正好一个的编码器和解码器。除此之外，该发明可以用在组合集成单元编码器/解码器中，一般称为“编解码器”。例如，应当明白尽管远程站能够从图 2 中所示的第一站 11 接收所捕获的图像，但典型的视频会议环境会也允许图像在远程站 36 被捕获，以传输回第一站 11。

应该明白所述位速率与相应于在第一站 11 捕获的图像的位速率一致。此外，注意所捕获的图像 48、50、52 和 54 中的每一个的 QP 值是同样的，因为它是位流本身的一部分。在图 2 和 3 中示出的例子中，所显示的图像 48-54 的 QP 值被举例说明为 10，并且 En1 的位速率是 5k 比特/s，Enc2 的位速率是 10k 比特/s，En3 的是 10k 比特，En4 的是 0k 比特/s。

参考图 2，应该明白摄影机 C1、C2、C3 以及 C4 中的每一个都是与每一个数字信号处理器（DSP）12a、14a、16a 以及 18a 相连的。但是，还应该明白摄像机 C1-C4 是通过在外部提供水平和垂直同步信号和像素时钟而在时间上同步的，以便简化 DSP 12a、14a、16a 以及 18a 所使用的速率控制算法的同步。例如，在每一个垂直同步消隐周期以及使用共用控制总线 28 的期间，所有数字信号处理器 12a-18a 都分别向彼此传送目标位速率，该目标速率是在对上一个由摄像机 C1-C4 捕获的画面进行编码时使用的。DSP 12a-18a 还以上一个由摄像机 C1-C4 所捕获的画面的平均 QP 值的形式，向彼此传送所达到的质量。在通过 BCM 30 从所有 DSP 12a-18a 接收每一个位速率值和 QP 值之后，每一个数字信号处理器 12a-18a 运行一个相同的算法，以便计算下一个目标位速率。这个目标或新的位速率被用在下一个由它相应的摄像机 C1-C4 所捕获画面的编码步骤中，当作速率控制参数。使用重新确定的位速率，该发明的系统和方法使得平均 QP 值基本相同，从而确保了构成宽带图像的画面的基本相同质量。这个进程在视频会议的存在期间持续，致使在站 36（图 3）显示的宽带图像的质量具有网络 34 的带宽和系统 10 的各个部件所允许的优良质量。注意，平均 QP 是通

过对属于编码画面的所有宏块的所有 QP 值求和，并用该编码画面中的宏块的数目去除它来计算的。还要注意，也可以在对一个画面、在许多视频压缩标准中叫做片的实体进行编码的同时，为多个宏块执行新目标位速率的计算。这样做，所述方法和系统的准确度可以更高，计算需求却更低。还可以将新目标位速率的计算之间的时间间隔提高到帧速率的倒数的倍数。在该情况下，计算需求更低。诸如平均 QP 形式的质量测量，总是使用所有那些宏块来加以执行的，那些宏块是在上一计算和当前计算之间的时间间隔内编码的。

为了确保所有编码器 12-18（图 2）用基本相同的 QP 值操作，DSP 12a-18a 采用了下面的公式和算法：

$$R(n)=\frac{T}{n} \qquad (1)$$

$$R_{temp}(n)=R_{prev}(n)+rate(\frac{\sum_{i=0}^{n}D_{prev}(i)}{n}-D_{prev}(n)) \qquad (2)$$

$$R(n)=T\frac{R_{temp}(n)}{\sum_{i=0}^{n}R_{temp}(n)} \qquad (3)$$

在根据公式（1）的初始化之后，通过运用公式（2）和（3），每一个编码器 12-18 分别生成一个新的位速率，该新的位速率用在由编码器 12-18 的相应摄影机 C1-C4 所捕获的下一画面的编码步骤中。新编码器速率是根据公式（2）-（3）来确定或计算的。应该明白，用于计算新位速率的时限可以与摄像机 C1-C4 关联的帧速率的倒数一样短。

公式（2）-(3)通过确定所有由摄像机 C1-C4 捕获的画面的平均失真和实际画面（Dprev(n)）的失真之间的差来计算每一个编码器 12a-18a 的新的位速率 R(n)。这个差通过函数 rate 进行加权，以计算用于补偿所捕获的图像的失真中的差的位速率差，该函数 rate 在公式（2）中称为“rate”。注意编码器 12-18 中的每一个的 Rtemp 值是通过运用公式（2）而获得的，并且是通过运用公式（3）而标准化的，从而使

得所有 R(n)的总和产生目标位速率 T。

所述压缩不是无损的，优选的是遵循混合编码器的原理。每个视频编码器 E(n)都能够在任何指定时间，报告由有损压缩产生的失真，比如 D(n)。D(n)可以用峰值信噪比(PSNR)、平方误差和（SSD）、绝对误差和（SAD）的形式或其它适当方式来加以计算。D(n)也可以启发式地来加以确定，例如通过将编码视频的平均量化因数用作质量指示。每一个视频编码器 E（n）还能够保持乘以画面速率后的每一个编码画面的比特的数目低于外部提供的最大比特数目，位速率 R(n)。整个由 n 个编码器 E（n）组成的系统还受最大目标位速率 T 的约束，因此 $T \geq \Sigma R$（n）。也就是，在任何指定时间点上，目标位速率 T 都必须不大于所有编码器位速率 R（n）的总和。以使所有编码器的失真 D（n）都均等的方式，所述用于大量视频画面的最佳传输的系统以固定时间间隔（例如帧距的整数倍）、可变时间间隔（例如，每当可获得足够的处理能力的时候）或以由用户界面的输入引发的方式，来调节每一个编码器的编码器位速率 R（n）。它通过执行 R(n)的线性最优化来这样做。

应该明白，如果函数 rate 总是生成在数学上正确的结果，那么第二步骤就是不必要的，假定在所有画面中的不变的平均活动性，这间接表明标准化不是必要的。但是，在包括多个摄影机 C1-C4 的典型视频会议环境中，常见的是失真会随图像的不同而不同，并且所有画面的位速率活动性不是不变的，例如，当一个所捕获的图像的位速率值变化或突然变得更活动的时候。显而易见，函数 rate R（n）高度依赖于由摄影机 C1-C4 所捕获的图像的内容。但是，应该理解，典型的是函数 rate 会是内容自适应（content-adaptive）的函数，因此允许对变化着的画面内容的适当修改。rate 函数的实现可以按常规利用例如在 Digital Multimedia Standards Series 中 Mitchell, J.L., W. B. Pennebaker, C. E. Fogg 和 D. J. LeGall 的"MPEG Video Compression Standard", Chapman & Hall, New York, NY, 1997; 以及 Haskell, B. G. , A. Puri 和 A. N.

Netravali 的"Digital Video: An Introduction to MPEG-2," ISBN：0-412-08411-2, Chapman & Hall, 1997 中描述的技术来实现，上述文件被结合于此并成为本文的一部分。

跨越图像 48-54（图 3）达到所希望的质量水平所要求的附加位的数目不仅随编码器 12-18 所使用的视频压缩技术而变化，还随要分别由编码器 12-18 来编码的所捕获的图像 20-26 的内容而变化。在简单化的实现中，函数 rate 可以从依据与要由摄影机 C1-C4 捕获的内容相似的内容生成的速率-失真曲线以及编码器 12-18 所采用的视频压缩算法导出。图 10 举例说明了一个速率-失真曲线，其示出了当位速率从例如大约 15Kbps 增长到大约 75 Kbps 的时候在失真方面的逐渐增长。如速率-失真曲线中的峰值信噪比（PSNR）值（以 dB 为单位来计量的）所指示的质量水平和 QP 值的关系取决于编码内容以及所采用的视频编码标准，在这里不需要进一步的讨论。

参考图 4 和 5，示出了一个供在数字信号处理器 12a-18a 上使用的位速率控制管理器（BCM）30 的实施例。如图所示，BCM 30 包括一个新位速率计算器 56，该计算器分别从多个编码器 12-18 中的每一个接收 QP 值 58、60、62 和 64。从由框 66 示意性地表示的摄像机 C1-C4 来的在前图像的实际位速率，也由位速率计算器 56 加以接收。运用前述公式（1）-（3），BCM 30 计算分别由编码器 12-18 的数字信号处理器 12a-18a 接收的新的位速率 NBW1-NBW4 或目标 T。新的位速率被用于下一组由摄影机 C1-C4 捕获的图像。当前位速率被数字信号处理器 12a-18a 用作包括在驻留于 En1-En4 12-18 上并被它们采用的（CBR）速率控制算法中的参数。如果正确计算的话，这个新目标位速率就迫使由编码器 12-18 生成的 QP 值基本相同，从而保证了所有图像在例如并排显示的时候图像质量基本相同。

现在参考图 5，该发明的进程和方法在框 70 处开始，在那里初始化视频会议。在初始化期间，在编码第一画面之前，运用公式（1）

来对 BCM 进行初始化。在框 72，BCM 30 确定编码器 12-18 中的每一个的上一所捕获的图像的位速率。然后 BCM 30 确定编码器 12-18 中的每一个的上一所捕获的图像的 QP 值（框 74），其后响应为编码器 12-18 中的每一个而接收的位速率(图 4 中的框 66)以及 QP 值 58-64 计算每一个编码器 12-18 的经调节的位速率（框 76）。在框 78，BCM 30 设置每一个编码器 12-18 的下一个所捕获的图像的位速率。在判决框 80，确定 BCM 30 接收的数据是不是与多个摄影机 C1-C4 捕获的上一图像关联的数据。如果是，那么视频会议结束（图 5 中的框 82），但是如果不是，那么例行程序循环返回到框 72，在框 72 中，如同所示的，下一所捕获的图像的数据和位速率可以得到处理。

本发明的系统和方法还通过图 6 到 8 以及相关描述而进行了举例说明。为了方便说明，应该理解摄影机 C1、C2 和 C4 捕获的图像被假定为在会议期间没有改变（即对象没有移动），而与摄影机 C3 所捕获的图像关联的位速率改变了，由于坐在图像捕获帧（图 6 中的帧 24）的右手侧的参与者或人改变了，因为在帧 24 的右侧的参与者（如图 6 中所看到的）从所坐的位置移动到站着的位置，胳膊是伸展的。如图 6 中所示，摄影机 C1-C4 捕获所示的图像，编码器 12-18 分别生成关联的位速率 5 Kbps、15 Kbps、10 Kbps 以及 0 Kbps。这些值分别由编码器 12-18 的数字信号处理器 12a 来接收。应该理解，为了方便说明，所述所捕获的图像被假定为是“上一所捕获的图像”（正如参考图 5 中框 72 的那样）。在正说明的例子中，还将假定该时间等于零毫秒或图 6 中视频会议的开始。注意，在图 6 中所示的例子中，在位速率方面基本上没有发生改变，因为在所捕获的帧 20-26 中的图像还没因为移动或与帧 20-26 关联的新位速率而改变。因此，编码器 12-18 的数字信号处理器 12a-18a 分别接收该位速率，并使用位速率算法并以稍早些在这里相对于图 4 和 5 描述的方式，计算基本相同的新的位速率值，即正在描述的实例中的 12。

但是，注意，如图 7 中所示，当帧 24 中的参与者从坐着的位置

站起到站着的位置的时候在位速率方面的变化。BCM 30（图 4）的位速率计算器 56 接收每一个编码器 12-18 的 QP 值，该值使用了上一所捕获的图像的位速率（即，5、15、10 和 0）（框 74）。但是，注意，速率控制算法所要求的 QP 值已显著改变了，因为编码器 12-18 的 QP 值分别是 10、10、18 和 10。这意味着，对于由编码器 12、14 和 18 编码的数据来说，在远程站 36 上显示的数据的图像的质量将得到改善，而根据由编码器 16 编码的数据在远程站 36 上显示的图像的质量相当大地降低了，导致在 QP 值方面的量化差 8（18-10）。因此，当包括所有图像 48-54 的宽带图像显示且彼此相邻的时候，第三帧中所显示或所投影的图像相当大地劣于其它三个帧。这个结果对于稍早些相对于现有技术所描述的来说是很典型的。在该发明的系统和方法中，QP 值差异仅存在几毫秒，所以对于人类的裸眼来说是察觉不到的，并且说明如下。

当下一个来自摄影机 C1-C4 的未编码的画面被编码器 12-18 处理的时候，编码器 12-18、DSP 12a-18a 接收未编码的画面并根据该发明使用公式（1）-（3）以及图 5 中所示的算法来处理它们，以计算将迫使来自每一个编码器 EN1-EN4 的 QP 值基本相同的新目标位速率。在正描述的例子中，当时间等于 60 毫秒的时候，如图 8 中所示，位速率确定装置 30 为下一组数据计算每一个编码器 EN1-EN4 的新的位速率，致使 QP 值将基本相同（正在描述的实例中的 13）。因此，本发明的系统和方法通过生成每一个编码器 12-18 的新的位速率来生成对每一个编码器的新的带宽分布，致使编码器 12-18 所编码的数据在为在远程站 36 上显示而被传输的时候与其关联的 QP 值基本相同。注意所使用的总的可用带宽没有改变，因为它在 54（12+12+18+12）开始，在 54（13+13+13+13）结束。

有利的是，这个系统和方法帮助了改善宽带或宽带图像的图像质量，该图像包括由多个诸如摄影机 C1-C4 此类的输入设备生成的多个子图像。总体改善或数据的负载均衡相当大地优化或改善了视频传输

系统的画面质量，这又反过来改善了总体的视频会议感受。

图 9 示出了该发明的另一实施例，该实施例示出了多个市场上可买到的编码器 80、82、84 和 86，例如可从加利福尼亚州的普莱森顿的 Polycom 公司得到的型号为 VS 4000 的编码器。该实施例还包括位速率控制管理器 88（BCM），其具有稍早些于此相对于所示的 BCM 30 和多路复用器 90 提到的特征。在所述实施例中，每一个编码器 En1-En4 80-86 是通过 IP 网络接口 92 来加以控制的，该接口可以基于以太网技术、其它 IEEE 802.x 分组网、串行链路或其它任何适当的网络技术，并且运行通常大家所知道的简单网络管理协议（SNMP，RFC3416）。IP 网络接口 92 运行 SNMP，被用来将来自编码器 80-86 的编码数据输出到将 IP 网络接口 90 连接到广域网（WAN）94 的网关，以及到远程位置 36 上的多路分离器 96、解码器 98、100、102 和 104。

BCM 88 使用 SNMP 来发送 SNMP 控制消息，并能够使用稍早些于此描述的方法和系统设置编码器 80-86 中的全部的目标位速率。

在该发明的这个实施例中，BCM 88 经由接口 92 以固定时间间隔（例如每 10 秒）请求所有编码器 80-86 的当前状态。BCM 88 使用稍早些于此描述的系统和方法来计算每一个编码器 80-86 的新目标位速率。在为每一个编码器 80-86 确定新位速率的计算之后，BCM 88 使用 SNMP 控制消息向编码器 80-86 中每一个传送新的位速率。

虽然在这里所描述的系统和方法，以及用于实现这些系统和方法的设备的形式，构成本发明的一个实施例，但是要理解该发明并不限于这些精确的方法和设备形式，可以在不偏离在所附权利要求中规定的发明范围的情况下做出一些改变。

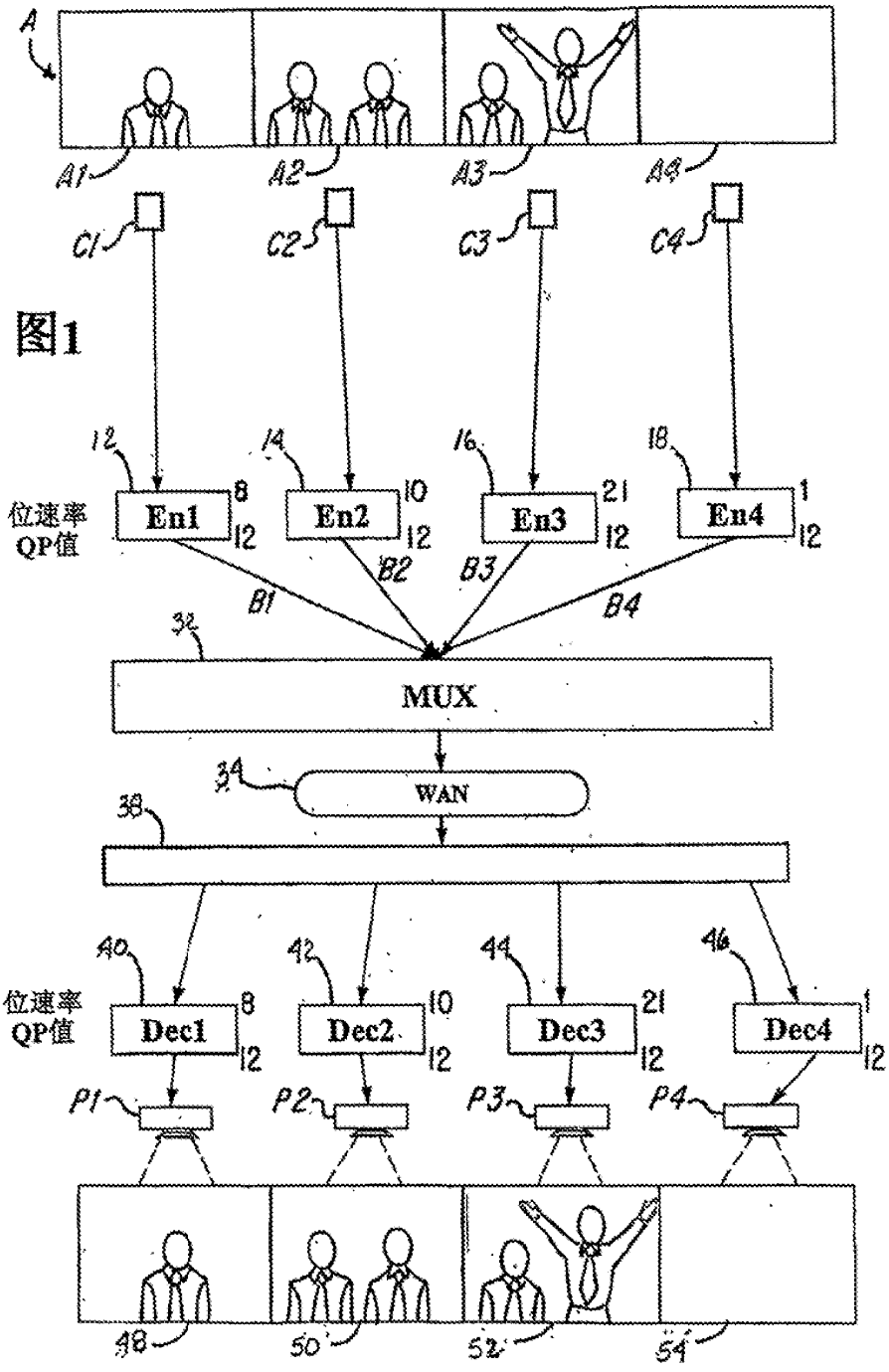

A
A1
A2
A3
A4
C1
C2
C3
C4
12
14
16
18
位速率
QP值
En1
En2
En3
En4
8
10
21
1
12
B1
B2
B3
B4
32
MUX
34
WAN
36
40
42
44
46
Dec1
Dec2
Dec3
Dec4
P1
P2
P3
P4
48
50
52
54

图1

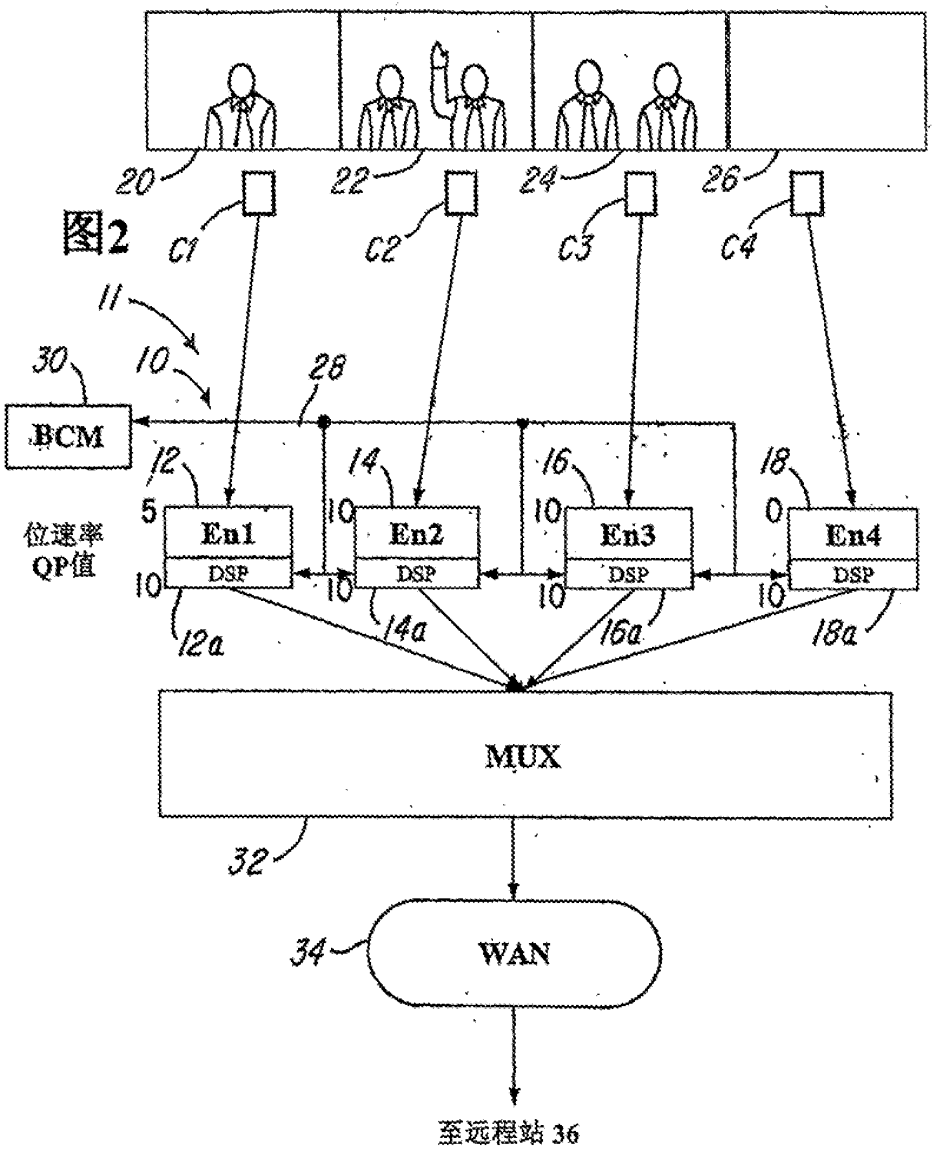

20
22
24
26
C1
C2
C3
C4
11
10
30
28
BCM
12
14
16
18
位速率
QP值
5
10
0
En1
En2
En3
En4
DSP
12a
14a
16a
18a
MUX
32
34
WAN
至远程站 36

图2

图3

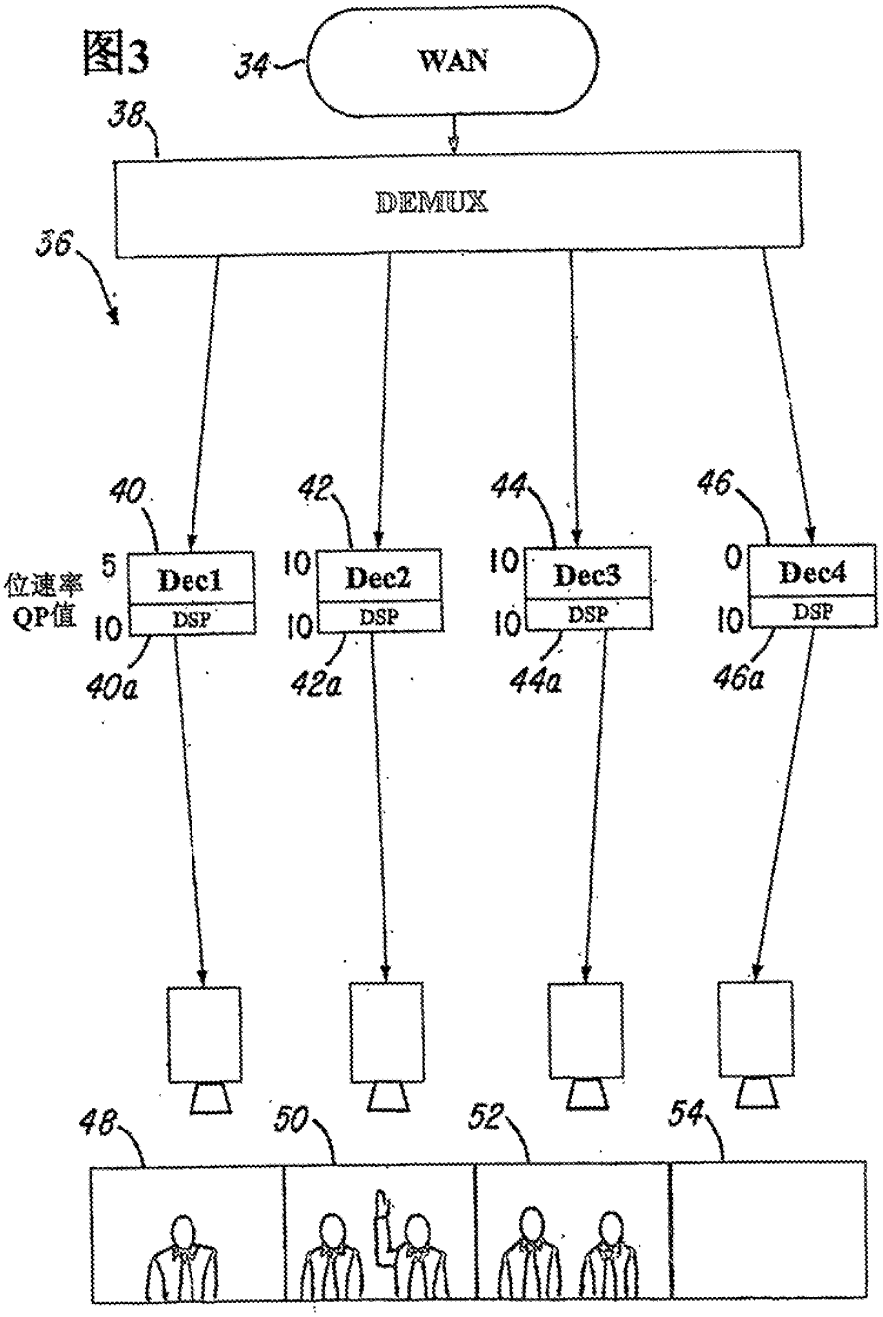

34
WAN
38
DEMUX
36
40
42
44
46
位速率
QP值
5
10
Dec1
DSP
10
Dec2
DSP
10
Dec3
DSP
0
Dec4
DSP
40a
42a
44a
46a
48
50
52
54

图4

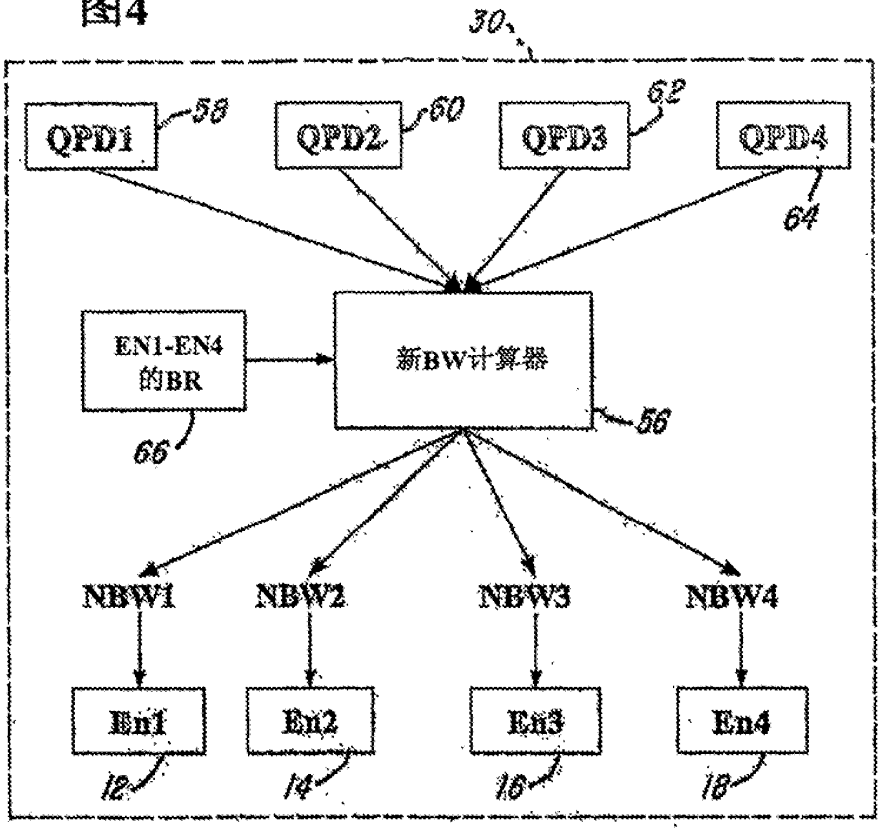

30
QPD1
58
QPD2
60
QPD3
62
QPD4
64
EN1-EN4
的BR
66
新BW计算器
56
NBW1
NBW2
NBW3
NBW4
En1
12
En2
14
En3
16
En4
18

图5

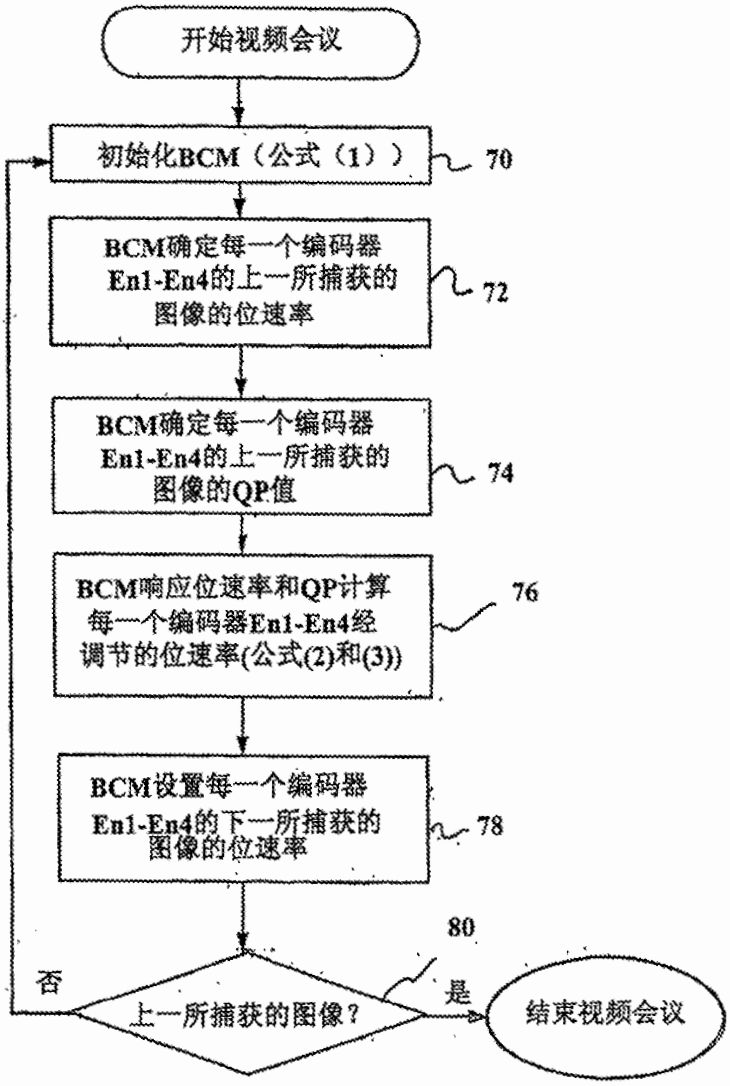

开始视频会议
初始化BCM（公式（1））
70
BCM确定每一个编码器En1-En4的上一所捕获的图像的位速率
72
BCM确定每一个编码器En1-En4的上一所捕获的图像的QP值
74
BCM响应位速率和QP计算每一个编码器En1-En4经调节的位速率(公式(2)和(3))
76
BCM设置每一个编码器En1-En4的下一所捕获的图像的位速率
78
80
否
上一所捕获的图像？
是
结束视频会议

图6

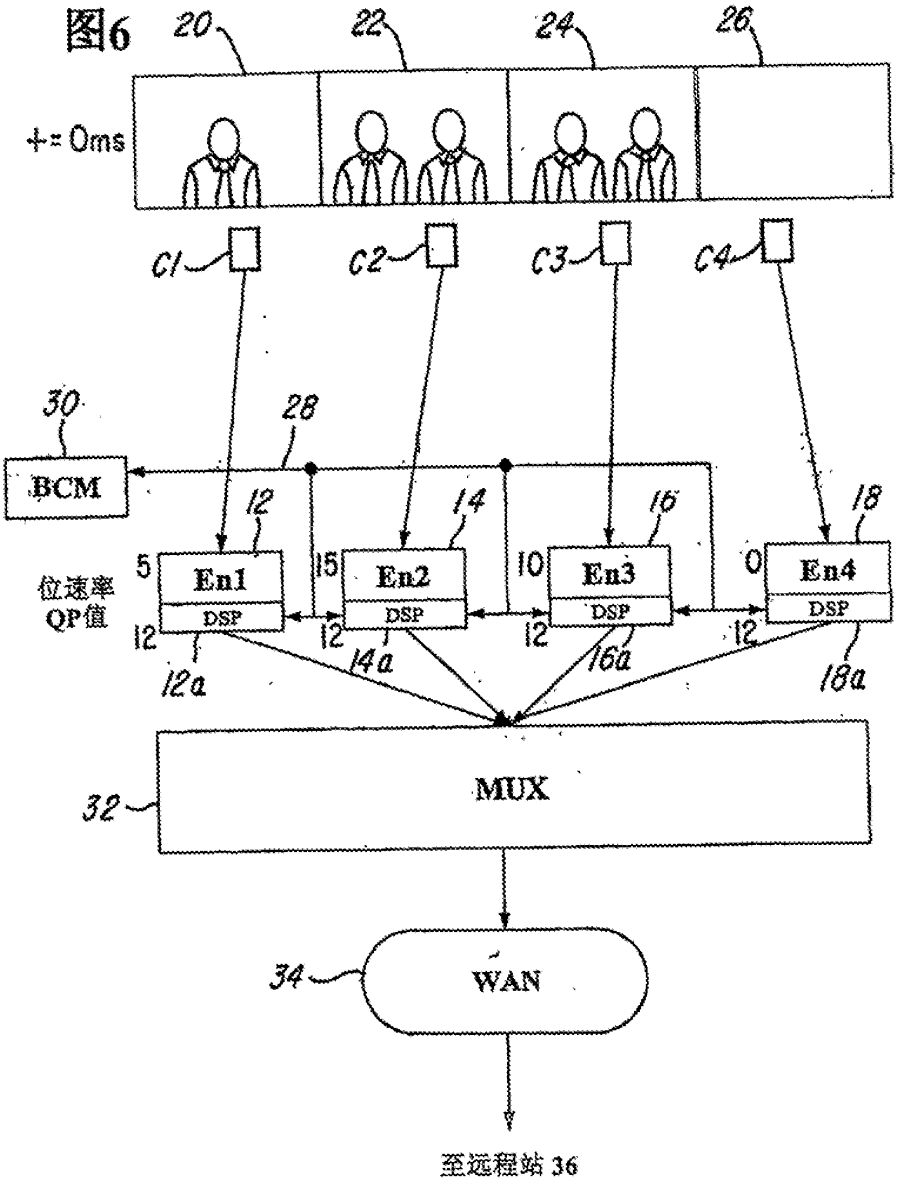

20
22
24
26
+= 0ms
C1
C2
C3
C4
30
28
BCM
12
14
16
18
位速率
QP值
5
15
10
0
En1
En2
En3
En4
DSP
12
12a
14a
16a
18a
MUX
32
WAN
34
至远程站 36

图7

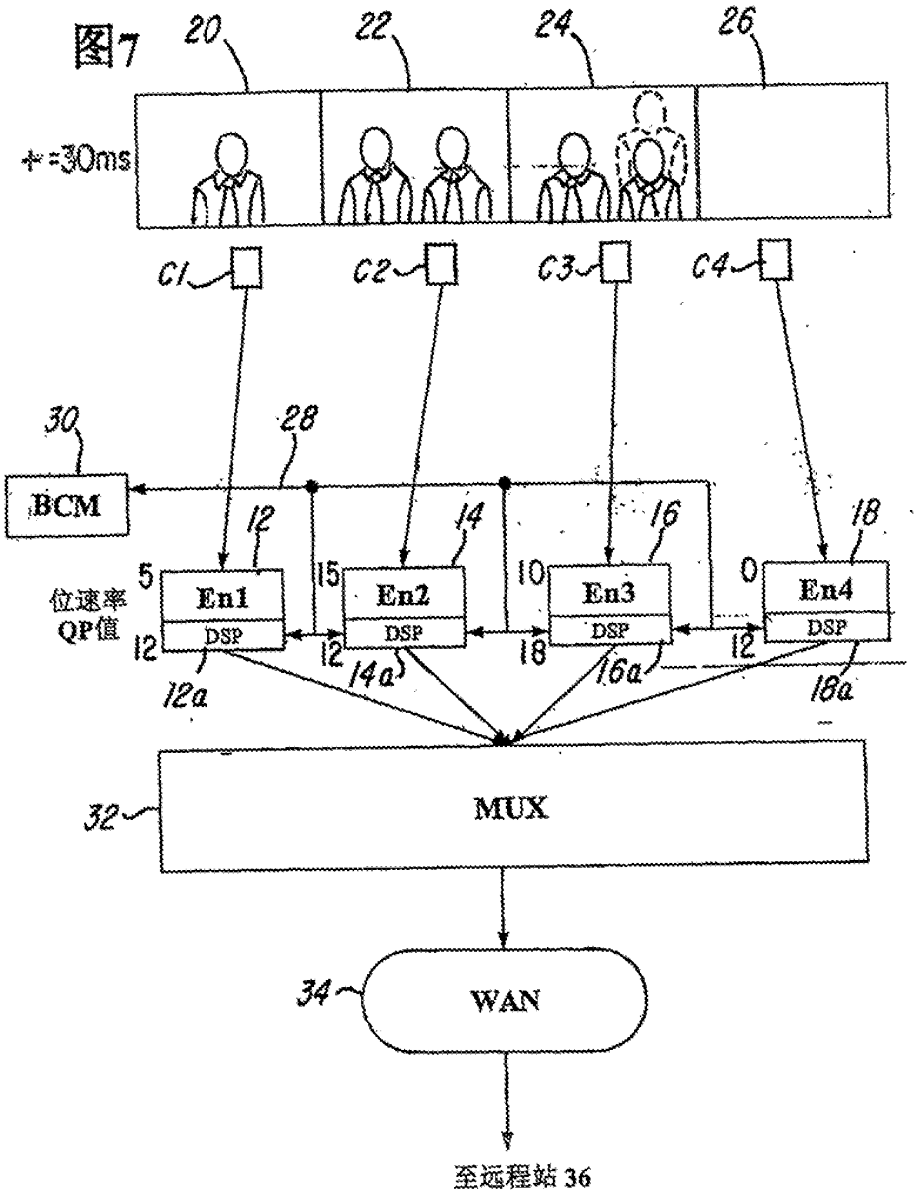

20
22
24
26
+=30ms
C1
C2
C3
C4
30
28
BCM
12
14
16
18
5
15
10
0
位速率
QP值
En1
En2
En3
En4
DSP
DSP
DSP
DSP
12
12
18
12
12a
14a
16a
18a
32
MUX
34
WAN
至远程站 36

图8

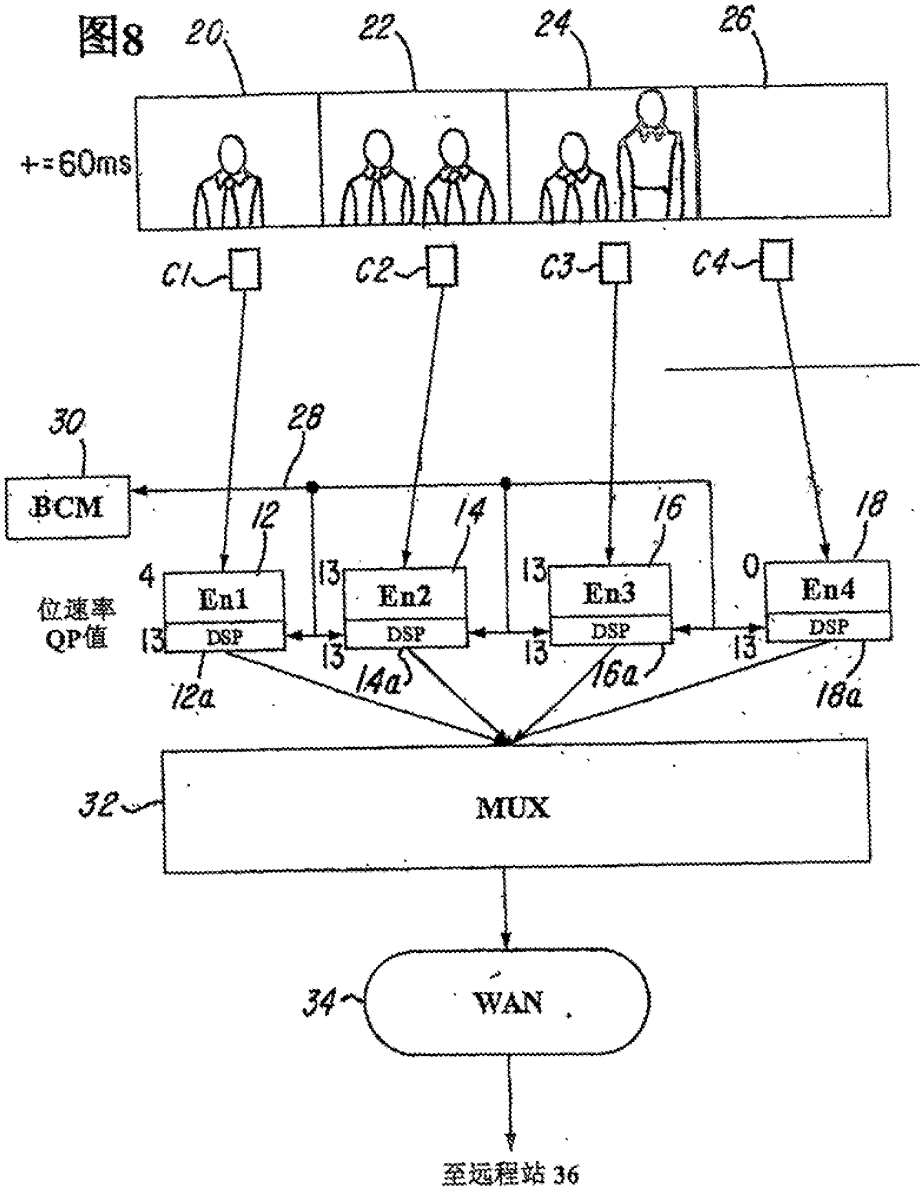

20
22
24
26
+=60ms
C1
C2
C3
C4
30
28
BCM
12
14
16
18
4
13
13
0
En1
En2
En3
En4
DSP
DSP
DSP
DSP
位速率
QP值
13
13
13
13
12a
14a
16a
18a
32
MUX
34
WAN
至远程站 36

图9

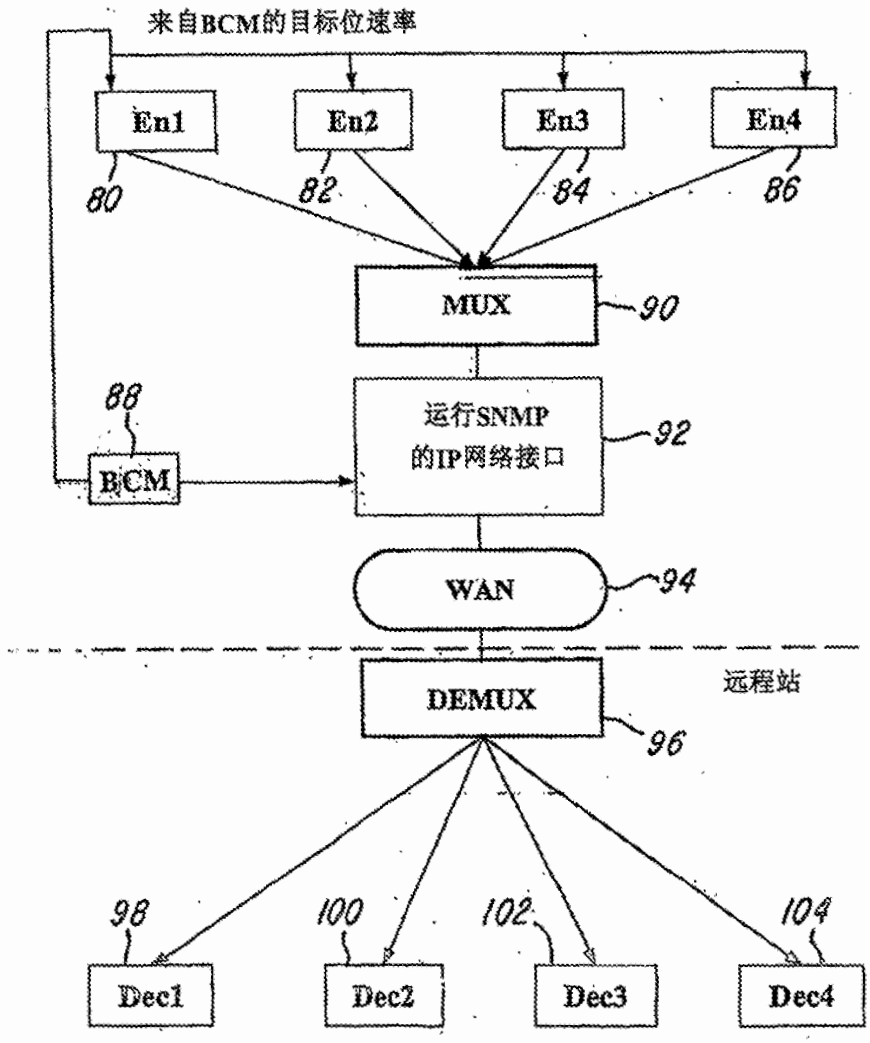
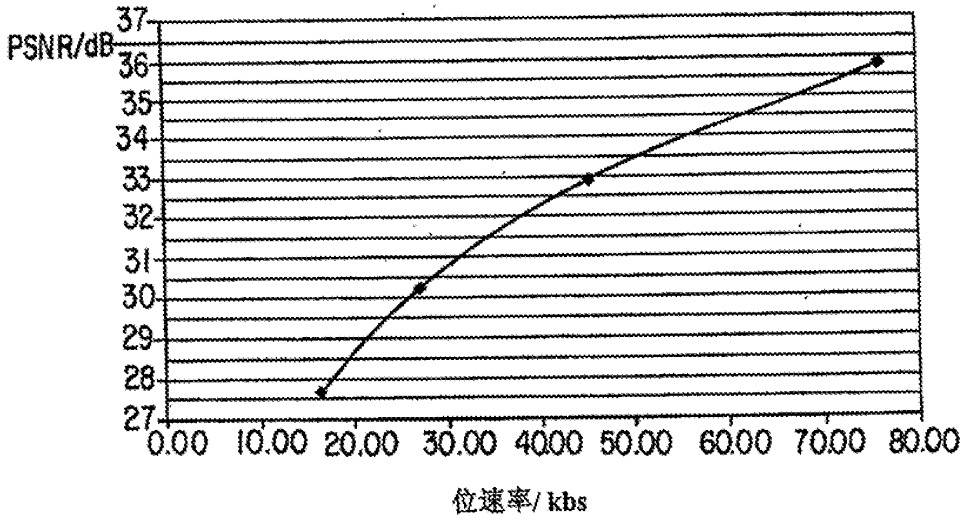

来自BCM的目标位速率
En1
En2
En3
En4
80
82
84
86
MUX
90
88
运行SNMP
的IP网络接口
92
BCM
WAN
94
远程站
DEMUX
96
98
100
102
104
Dec1
Dec2
Dec3
Dec4

图10


PSNR/dB
37
36
35
34
33
32
31
30
29
28
27
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
位速率/ kbs

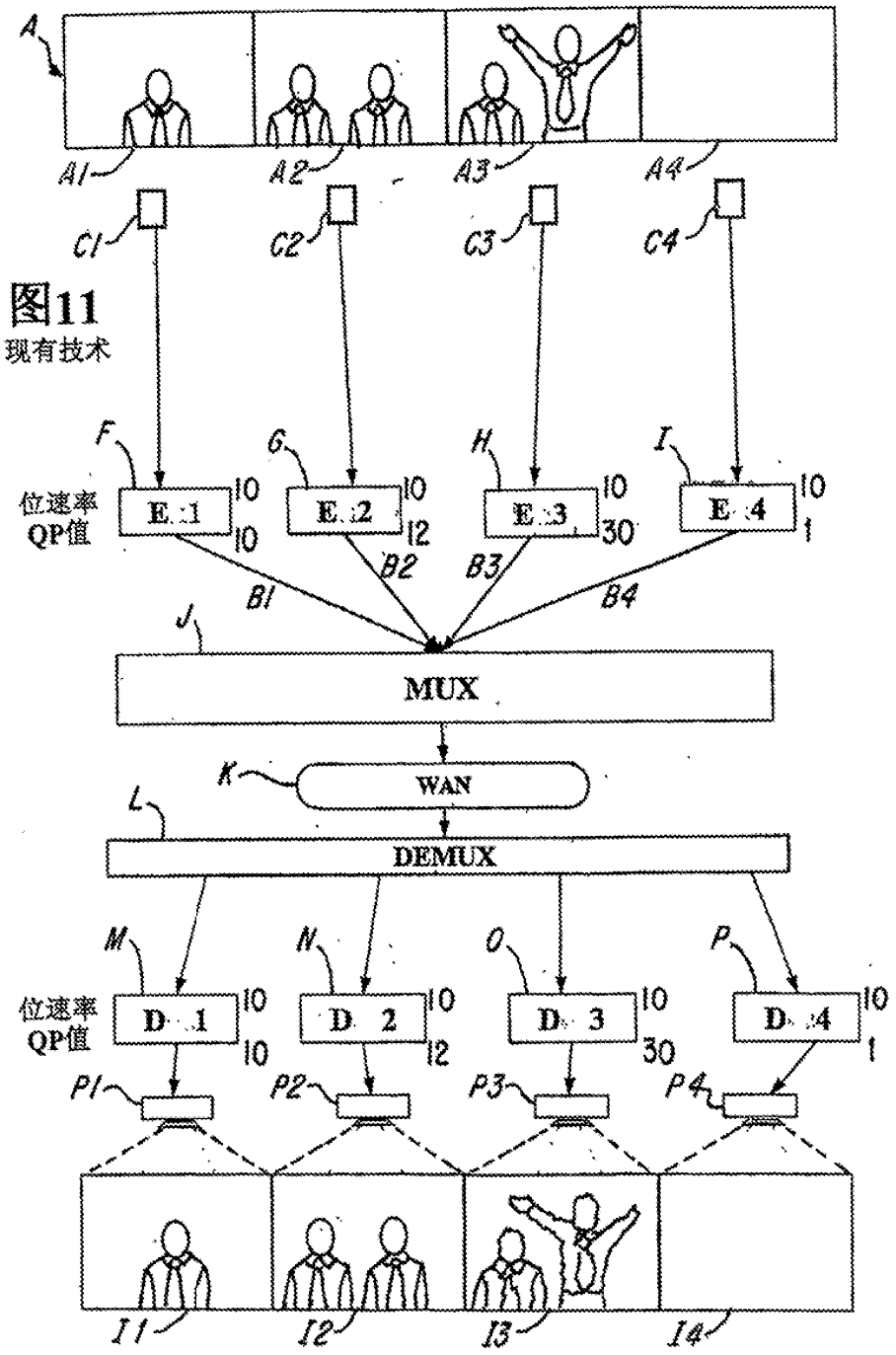

A
A1
A2
A3
A4
C1
C2
C3
C4
F
G
H
I
位速率
QP值
E 1
E 2
E 3
E 4
10
10
12
30
1
B1
B2
B3
B4
J
MUX
K
WAN
L
DEMUX
M
N
O
P
D 1
D 2
D 3
D 4
P1
P2
P3
P4
I1
I2
I3
I4

图11
现有技术

Espacenet

Bibliographic data: CN101022529 (A) — 2007-08-22

Several to one transmission via local network and displaying information method and system

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Applicant(s): LIXING INTERNAT SCIENCE & TECH [CN] ± (LIXING INTERNATIONAL SCIENCE & TECHNOLOGY CO., LTD)

Classification: **- international:** ***G09G5/00; G09G5/36; H04N7/15***
- cooperative:

Application number: CN2006104697 20060215

Priority number(s): CN2006104697 20060215

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Abstract of CN101022529 (A)

A method for transmitting and displaying information by local area network several-for-one includes regulating preset display information to be transmitted processing unit separately by the first and the second electronic devices according to a picture layout, transmitting regulated display information to processing unit for carrying out integration on regulated display information and outputting integrated display information by output unit. The system used for realizing said method is also disclosed.

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G09G 5/00 (2006.01)

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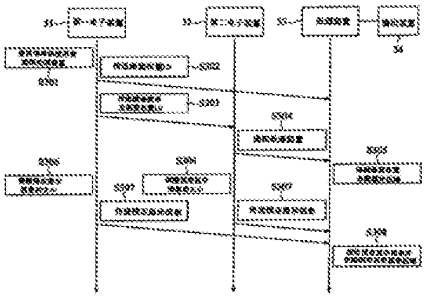
权利要求书 6 页 说明书 8 页 附图 9 页

[54] 发明名称

以局域网多对一传输并显示信息的方法及系统

[57] 摘要

一种以局域网多对一传输并显示信息的方法，应用于一第一电子装置、至少一第二电子装置以及至少一处理装置所组成的一局域网，并配合一输出装置以显示一显示信息。该方法将想要传送至该处理装置的预定显示信息分别由该第一电子装置以及该第二电子装置依据一画面布置先行调整，之后再传送至该处理装置整合成该显示信息供该输出装置输出，以减少传输数据量及整合处理的运算量。同时亦揭露一种以局域网多对一传输并显示信息的系统。



1. 一种以局域网多对一传输并显示信息的方法，应用于一第一电子装置、至少一第二电子装置以及至少一处理装置所组成的一局域网，并配合一输出装置以显示一显示信息，该方法的步骤包含：

该第一电子装置提供一包含该局域网上的该处理装置的清单，以供一使用者选择其中之一；

该第一电子装置传送一画面布置至被选择的该处理装置，该画面布置包含M个显示区域以及每一该显示区域的几何信息，其中M≧2，M为正整数；

该第一电子装置传送一邀请要求以及该画面布置至该第二电子装置；

该第二电子装置同意该邀请要求时，该第二电子装置通知被选择的该处理装置；

该处理装置依据一分配原则，依序分配该 M 个显示区域给该第一电子装置以及 N 个被邀请的该第二电子装置以显示该显示信息，其中 1≦N≦M-1，N 为正整数；

该第一电子装置以及该第二电子装置分别依据被分配到的该显示区域的几何信息调整一预定显示信息的几何大小，并分别将已调整的该预定显示信息传送至该处理装置；

该处理装置接收已调整的该预定显示信息并更新相对应的该显示区域；以及

该输出装置依据该显示区域的数据定期更新该显示信息。

2. 如权利要求 1 所述的以局域网多对一传输并显示信息的方法，其中该清单是该第一电子装置事先或即时搜索该局域网上的该处理装置所建立的。

3. 如权利要求 1 所述的以局域网多对一传输并显示信息的方法，更包含：

该第一电子装置传送该画面布置至被选择的该处理装置前，与该处理装置进行一验证程序。

4. 如权利要求 1 所述的以局域网多对一传输并显示信息的方法，更包含：

该第一电子装置提供多个该画面布置的模板供该使用者选择其中之一。

5. 如权利要求 1 所述的以局域网多对一传输并显示信息的方法，更包含：

该第一电子装置及/或该第二电子装置在传送该预定显示信息至该处理装置前，先进行一压缩编码程序，该处理装置接收到该预定显示信息时则进行相对应的一解码程序。

6. 如权利要求 1 所述的以局域网多对一传输并显示信息的方法，其中该分配原则为先来先服务原则。

7. 如权利要求 1 所述的以局域网多对一传输并显示信息的方法，更包含：

该第一电子装置或该 N 个第二电子装置要求该处理装置更改该画面布置，且该画面布置异动时，该处理装置通知该第一电子装置以及该 N 个第二电子装置，该第一电子装置以及该 N 个第二电子装置以异动后的该显示区域的几何信息调整该预定显示信息的几何大小并传送至该处理装置。

8. 如权利要求 1 所述的以局域网多对一传输并显示信息的方法，更包含：

当该第一电子装置或该 N 个第二电子装置其中之一传送一全屏幕模式要求至该处理装置时，该处理装置要求其余该第一电子装置以及该第二电子装置停止传送该预定显示信息，使该输出装置以全屏幕模式显示提出该全屏幕模式要求的电子装置的该预定显示信息，且该

处理装置执行该全屏幕模式要求时，更传送一失效命令，使其余该第一电子装置或该第二电子装置的该全屏幕模式要求失效；在结束该全屏幕模式时，该处理装置将该显示区域的分配状态通知该第一电子装置以及该 N 个第二电子装置。

9. 如权利要求 1 所述的以局域网多对一传输并显示信息的方法，更包含：

该处理装置将该第一电子装置以及 N 个该第二电子装置的装置名称或使用者名称分别显示于相对应的该显示区域；该第一电子装置以及该第二电子装置则显示其正在使用的该显示区域。

10. 如权利要求 1 所述的以局域网多对一传输并显示信息的方法，其中该显示区域的几何信息包含一矩形的长度及宽度，及/或描述该矩形的坐标信息。

11. 如权利要求 1 所述的以局域网多对一传输并显示信息的方法，其中该第一电子装置以及该第二电子装置为一电脑、个人数字助理、移动电话、无线投影仪转换器、无线机顶盒、无线数字媒体转换器、无线光盘播放器、无线 DVD 播放器、无线录影机、无线游戏机或无线便携式媒体播放器；

该处理装置为一电脑、个人数字助理、移动电话、无线投影仪转换器、无线机顶盒、无线数字媒体转换器、无线光盘播放器、无线 DVD 播放器、无线录影机、无线游戏机或无线便携式媒体播放器；

该输出装置为一投影仪、屏幕或电视。

12. 一种以局域网多对一传输并显示信息的系统，其包含：

一第一电子装置；

至少一第二电子装置，其与该第一电子装置信号连接；

至少一处理装置，其与该第一电子装置以及该第二电子装置信号连接，该第一电子装置、该第二电子装置以及该处理装置组成一局域

网；以及

一输出装置，用以显示一显示信息；

其中，该第一电子装置提供一包含该局域网上的该处理装置的清单，以供一使用者选择其中之一；

该第一电子装置传送一画面布置至被选择的该处理装置，该画面布置包含M个显示区域以及每一该显示区域的几何信息，其中M≧2，M为正整数；

该第一电子装置传送一邀请要求以及该画面布置至该第二电子装置；

该第二电子装置同意该邀请要求时，该第二电子装置通知被选择的该处理装置；

该处理装置依据一分配原则，依序分配该 M 个显示区域给该第一电子装置以及 N 个被邀请的该第二电子装置以显示该显示信息，其中 1≦N≦M-1，N 为正整数；

该第一电子装置以及该第二电子装置分别依据被分配到的该显示区域的几何信息调整一预定显示信息的几何大小，并分别将已调整的该预定显示信息传送至该处理装置；

该处理装置接收已调整的该预定显示信息并更新相对应的该显示区域；以及

该输出装置依据该显示区域的数据定期更新该显示信息。

13. 如权利要求 12 所述的以局域网多对一传输并显示信息的系统，其中该清单是该第一电子装置事先或即时搜索该局域网上的该处理装置所建立的。

14. 如权利要求 12 所述的以局域网多对一传输并显示信息的系统，其中该第一电子装置传送该画面布置至被选择的该处理装置前，与该处理装置进行一验证程序。

15. 如权利要求 12 所述的以局域网多对一传输并显示信息的系

统，其中该第一电子装置提供多个该画面布置的模板供该使用者选择其中之一。

16. 如权利要求 12 所述的以局域网多对一传输并显示信息的系统，其中该第一电子装置及/或该第二电子装置在传送该预定显示信息至该处理装置前，先进行一压缩编码程序，该处理装置接收到该预定显示信息时则进行相对应的一解码程序。

17. 如权利要求 12 所述的以局域网多对一传输并显示信息的系统，其中该第一电子装置或该 N 个第二电子装置可要求该处理装置更改该画面布置，且该处理装置在该画面布置异动时，通知该第一电子装置以及该 N 个第二电子装置，该第一电子装置以及该 N 个第二电子装置以异动后的该显示区域的几何信息调整该预定显示信息的几何大小并传送至该处理装置。

18. 如权利要求 12 所述的以局域网多对一传输并显示信息的系统，其中该处理装置接收到该第一电子装置或该 N 个第二电子装置其中之一传送一全屏幕模式要求时，即要求其余该第一电子装置以及该第二电子装置停止传送该预定显示信息，使该输出装置以全屏幕模式显示提出该全屏幕模式要求的电子装置的该预定显示信息，且该处理装置执行该全屏幕模式要求时，更传送一失效命令，使其余该第一电子装置或该第二电子装置的该全屏幕模式要求失效；在结束该全屏幕模式时，该处理装置将该显示区域的分配状态通知该第一电子装置以及该 N 个第二电子装置。

19. 如权利要求 12 所述的以局域网多对一传输并显示信息的系统，其中该处理装置将该第一电子装置以及 N 个该第二电子装置的装置名称或使用者名称分别显示于相对应的该显示区域；该第一电子装置以及该第二电子装置则显示其正在使用的该显示区域。

20. 如权利要求 12 所述的以局域网多对一传输并显示信息的系统，其中该显示区域的几何信息包含一矩形的长度及宽度，及/或描述该矩形的坐标信息。

21. 如权利要求 12 所述的以局域网多对一传输并显示信息的系统，其中该局域网为一有线或无线局域网。

22. 如权利要求 12 所述的以局域网多对一传输并显示信息的系统，其中该第一电子装置以及该第二电子装置为一电脑、个人数字助理、移动电话、无线投影仪转换器、无线机顶盒、无线数字媒体转换器、无线光盘播放器、无线 DVD 播放器、无线录影机、无线游戏机或无线便携式媒体播放器；

该处理装置为一电脑、个人数字助理、移动电话、无线投影仪转换器、无线机顶盒、无线数字媒体转换器、无线光盘播放器、无线 DVD 播放器、无线录影机、无线游戏机或无线便携式媒体播放器；

该输出装置为一投影仪、屏幕或电视。

以局域网多对一传输并显示信息的方法及系统

技术领域

本发明关于一种以局域网多对一传输并显示信息的方法及系统，尤其关于一种节省网络带宽以及降低显示处理负荷的多对一传输并显示信息的方法及系统。

背景技术

由于信息科技的快速发展，各种信息的数字化应用已愈来愈普及。其中一种应用方式便是将屏幕画面分割成多个显示区域，并将每个显示区域分别提供给多个信息来源使用，使多个信息可同时显示于一个屏幕画面中，例如在进行会议的时候。

请参照图 1，为了实现上述多对一传输并显示信息的目的，已知的多对一传输并显示信息系统 1 将第二电子装置 12、13 的未处理信息 UPD 传送至第一电子装置 11。第一电子装置 11 连同本身的未处理信息 UPD 一并进行画面的整合处理，再将已整合处理的画面 IPF 传送至第三电子装置 14。最后，第三电子装置 14 将已整合处理的画面 IPF 交由输出装置 15 输出。

请参照图 2，另一种多对一传输并显示信息系统 2，其由第一电子装置 21 先将画面布置 LO 的相关信息传送至第三电子装置 24。之后，第一电子装置 21 以及第二电子装置 22、23 便分别将未处理信息 UPD 传送至第三电子装置 24。第三电子装置 24 即根据先前收到的画面布置 LO 进行画面的整合处理。最后，第三电子装置 14 也将已整合处理的画面交由输出装置 15 输出。

上述两种已知技术包含下列缺点。其一，第一电子装置、第二电子装置以及第三电子装置之间以局域网连接，若直接传送未经处理的信息将大大消耗网络带宽，而影响网络的其它使用者，甚至发生带宽消耗严重而造成画面延迟的问题。其二，无论是由第一电子装置 11

或是第三电子装置 24 进行画面的整合处理，信息整合端(第一电子装置 11 或第三电子装置 24)都必须有较佳的运算处理能力。运算处理能力较佳的硬件设备即意味着较高的硬件成本。若运算处理能力不足时，同样会造成画面延迟的问题。

综上所述，如何改善多对一传输并显示信息系统的网络带宽消耗以及降低信息整合端处理画面整合的运算量便是目前亟需努力的目标。

发明内容

针对上述问题，本发明的目的在于提供一种以局域网多对一传输并显示信息的方法及系统，其可减少网络带宽的消耗以及降低信息整合端处理画面整合的运算量。

为了达到上述目的，本发明的以局域网多对一传输并显示信息的方法应用于一第一电子装置、至少一第二电子装置以及至少一处理装置所组成的一局域网，并配合一输出装置以显示一显示信息，该方法的步骤包含：该第一电子装置提供一包含该局域网上的该处理装置的清单，以供一使用者选择其中之一；该第一电子装置传送一画面布置至被选择的该处理装置，该画面布置包含 M 个显示区域以及每一该显示区域的几何信息，其中 M≧2，M 为正整数；该第一电子装置传送一邀请要求以及该画面布置至该第二电子装置；该第二电子装置同意该邀请要求时，该第二电子装置通知被选择的该处理装置；该处理装置依据一分配原则，依序分配该 M 个显示区域给该第一电子装置以及 N 个被邀请的该第二电子装置以显示该显示信息，其中 1≦N≦M-1，N 为正整数；该第一电子装置以及该第二电子装置分别依据被分配到的该显示区域的几何信息调整一预定显示信息的几何大小，并分别将已调整的该预定显示信息传送至该处理装置；该处理装置接收已调整的该预定显示信息并更新相对应的该显示区域；以及该输出装置依据该显示区域的数据定期更新该显示信息。

本发明的以局域网多对一传输并显示信息的系统包含一第一电子装置、至少一第二电子装置、至少一处理装置以及一输出装置。该

输出装置与该处理装置信号连接，用以显示信息。该第一电子装置、该第二电子装置以及该处理装置在一局域网上，并执行上述方法，在此不再赘述。

依据本发明的以局域网多对一传输并显示信息的方法及系统，其在传送预定显示信息前，先进行调整以有效降低传输的数据量，因此可有效减少网络带宽的消耗。同时，处理装置仅需要直接将其整合成一个显示画面即可，因此大大降低信息整合端处理画面整合的运算量。

附图说明

图 1 为一已知的多对一传输并显示信息的架构；

图 2 为另一已知的多对一传输并显示信息的架构；

图 3 为本发明优选实施例的以局域网多对一传输并显示信息的方法及系统；

图 4 为一流程图，显示本发明优选实施例的第一电子装置的实施步骤；

图 5 为一流程图，显示本发明优选实施例的第二电子装置的实施步骤；

图 6 为一流程图，显示本发明优选实施例的处理装置的实施步骤；

图 7 为一流程图，显示本发明优选实施例中更改画面布置的实施步骤；

图 8 为一示意图，显示本发明优选实施例的显示画面；以及

图 9 为一示意图，显示本发明优选实施例中的传送端的使用者界面。

具体实施方式

以下将参照相关附图，说明依本发明优选实施例的以局域网多对一传输并显示信息的方法及系统，其中相同的元件将以相同的参照符号加以说明。

请参照图 3，本发明优选实施例的以局域网多对一传输并显示信息的方法应用于一第一电子装置 31、至少一第二电子装置 32 以及至少一处理装置 33 所组成的一局域网，并配合一输出装置 34 以显示信息。信息的种类可为视频(Video)、图像(Image)、图形(Graphic)、文字(Text)、演示文稿(Presentation)、屏幕撷取(Screen capture)、或以上的组合等形式的信息。

本发明的方法的执行过程如图 3 所示，首先，第一电子装置 31 提供一清单以供使用者选择其中的一处理装置 33，其中该清单包含该局域网上的处理装置 33(S301)。使用者选择处理装置 33 之后，第一电子装置 31 即与被选择的处理装置 33 建立连线。建立网络连线的方式为本发明所属技术领域的普通技术人员所熟知，例如第一电子装置 31 以一使用请求通知被选择的处理装置 33，被选择的处理装置 33 则回传一回应以建立连线，故在此不再详述建立连线的方式。接着，第一电子装置 31 传送一画面布置 LO 至被选择的处理装置 33(S302)。画面布置 LO 包含 M 个显示区域以及每一个显示区域的几何信息，其中 M≧2，M 为正整数。第一电子装置 31 再传送一邀请要求以及画面布置 LO 至第二电子装置 32(S303)，以邀请第二电子装置 32 传送信息供输出装置 34 显示。若第二电子装置 32 接受邀请，第二电子装置 32 则通知被选择的处理装置 33(S304)。处理装置 33 依据画面布置 LO 以及一分配原则，依序分配显示区域给第一电子装置 31 以及 N 个被邀请的第二电子装置 32 供其显示信息(S305)，其中 1≦N≦M-1，N 为正整数。例如，将一屏幕画面分割成四分格，亦即有 4 个显示区域供 4 个电子装置显示信息，其中 1 个显示区域供第一电子装置 31 使用，其余 3 个显示区域则可以先来先服务(First Come First Served)原则分配给被邀请的第二电子装置 32 使用。

第一电子装置31 以及第二电子装置32 分别依据被分配到的显示区域的几何信息调整预定显示信息的几何大小(S306)，例如降低画面的分辨率，再分别将已调整的预定显示信息传送至处理装置(S307)。处理装置 33 接收已调整的预定显示信息并更新相对应的显示区域(S308)。最后由输出装置 34 依据每一个显示区域的数据定期更新画面。

请参照图 4，说明第一电子装置 31 的详细执行流程。首先，第一电子装置 31 先搜索局域网上的处理装置(S401)并建立清单，此操作可以在使用者要求提供清单时执行，亦可在第一电子装置 31 闲置

时，或局域网闲置时事先进行搜索。接着，第一电子装置 31 提供包含处理装置的清单供使用者选择(S402)。在使用者选择处理装置 33 之后，第一电子装置 31 即与被选择的处理装置 33 建立连线，其连线方式为本发明所属技术领域的普通技术人员所熟知，在此不再赘述，连线之后第一电子装置 31 再把画面布置 LO 传送至处理装置 33(S406)。

需注意的是，若处理装置 33 具有安全设定，则第一电子装置 31 要求使用处理装置 33 时，需先进行一验证程序(S403)，例如输入密码等方式进行验证，验证完成后才进行接下来的步骤流程(S404)。否则回到验证程序直到验证完成，或使用者放弃验证并退出系统。此外，第一电子装置 31 可提供多个画面布置 LO 的模板(template)供使用者选择(S405)，例如四分格、九宫格等，以便利使用者规划屏幕画面。

接着，第一电子装置 31 传送邀请要求以及画面布置 LO 至第二电子装置 32(S407)。需注意的是，此邀请要求不限定任何形式，其不仅可经由第一电子装置 31 发出，甚至可以由使用者直接进行口头上的邀请，此邀请方式在会议进行中特别适用。

处理装置 33 依据画面布置 LO，依序分配显示区域给第一电子装置 31 以及被邀请的第二电子装置 32 供其显示信息，当第一电子装置 31 接收被分配到的显示区域(S408)的信息后，即可依据显示区域的几何信息调整预定显示信息的大小(S409)。例如，显示区域为一矩形，该显示区域的几何信息包含了矩形的长度、宽度及/或描述该矩形的坐标信息，例如矩形的端点坐标。之后，第一电子装置 31 再将已调整过的预定显示信息传送至处理装置 33(S411)。最后，判断使用者是否要求结束传送信息，若否，则回到步骤 S409，继续调整预定显示信息并进行传送。为了进一步节省网络带宽，可在传送预定显示信息前先进行一压缩编码程序(S410)，处理装置 33 接收到经过压缩编码的信息时，执行相对应的解码程序即可正常处理接收到的信息。

请参照图 5，说明第二电子装置 32 的详细执行流程。首先，第二电子装置 32 先接收到第一电子装置 31 的邀请要求及画面布置 LO(S501)。若第二电子装置 32 不接受邀请(S502)则直接结束。若第二电子装置 32 接受邀请，则通知被选择的处理装置 33 以建立连线(S503)，例如传送一使用请求。处理装置 33 依据画面布置 LO，依序分配显示区域给第一电子装置 31 以及被邀请的第二电子装置 32 供其显示信息，当第二电子装置 32 接收被分配到的显示区域(S504)的信

息后，即可依据显示区域的几何信息调整预定显示信息的大小(S505)，再将已调整过的预定显示信息传送至处理装置33(S507)。最后，判断使用者是否要求结束传送信息，若否，则回到步骤 S505，继续调整预定显示信息并进行传送。同样的，第二电子装置 32 可在传送预定显示信息前先进行压缩编码程序(S506)，处理装置 33 接收到经过压缩编码的信息时，即执行相对应的解码程序。

请参照图 6，说明处理装置 33 的详细执行流程。首先，处理装置 33 与第一电子装置 31 建立连线后，处理装置 33 即接收第一电子装置 31 传送来的画面布置 LO(S601)，画面布置 LO 包含 M 个显示区域以及每一个显示区域的几何信息，其中 M≧2，M 为正整数。需注意的是，若处理装置 33 具有安全设定，则第一电子装置 31 与处理装置 33 建立连线时，需先进行一验证程序，例如输入密码等方式进行验证。接着，侦测并接收被邀请的第二电子装置 32 的使用请求(S602)。处理装置 33 根据先来先服务(First Come First Served)原则分配画面布置中的显示区域给第一电子装置 31 以及被邀请的第二电子装置 32 使用(S603)。之后，处理装置 33 即等待接收第一电子装置 31 及第二电子装置 32 传送过来的已调整预定显示信息(S604)。若已调整预定显示信息经过压缩编码，处理装置 33 则进行一解码程序(S605)，以利后续处理。处理装置 33 再将接收到的已调整预定显示信息整合成一显示信息(S606)，即显示画面，再传送至输出装置 34 加以输出显示(S607)。如此反复步骤 S604 至 S607 直到使用者要求结束。

请参考图 8，处理装置 33 除了依据画面布置 LO 的显示区域 81 将预定显示信息分配整合于显示画面 8 中，亦可将第一电子装置 31 以及第二电子装置 32 的装置名称或是使用者名称分别显示于相对应的显示区域 81。如图 8 所示，即是将使用者名称 811 标示于相对应显示区域 81 的右下角。同样的，第一电子装置 31 以及第二电子装置 32 的使用者界面也可显示其正在使用的显示区域。如图 9 所示，传送端的使用者界面 91~94 中的图示 911 即显示目前使用的显示区域。举例而言，对应于图 8 的显示区域，传送端 Thomas 正在使用左上角的显示区域，即如使用者界面 91 中的图示 911 所示。

需注意的是，第一电子装置 31 在重复步骤 S409~S412 时，可随时依使用者要求更改画面布置 LO。举例而言，同一画面布置 LO 第一电子装置 31 要求更改分配状态，或是直接更改画面布置 LO，例如从四分格更改为九宫格，或是子母画面等。同理，第二电子装置 32

也可在重复步骤 S505~S508 时，随时依使用者要求更改画面布置 LO。更改画面布置 LO 的处理流程如图 7 所示。第一电子装置 31 或第二电子装置 32 要求处理装置 33 更改画面布置 LO(S701)。处理装置 33 判断是否为全屏幕(full screen)模式要求(S702)。若否，执行步骤 S703，处理装置 33 通知第一电子装置 31 以及第二电子装置 32 更新画面布置 LO。第一电子装置 31 以及第二电子装置 32 即以更新后的画面布置 LO 调整预定显示信息，并传送至处理装置(S704)，往后的调整及传送步骤如前所述，在此不再赘述。

若更新画面布置的要求为全屏幕模式，则执行步骤 S705，处理装置要求未提出全屏幕模式要求的第一电子装置 31 或第二电子装置 32 停止传送预定显示信息，或是处理装置 33 直接不处理这些预定显示信息。接着，处理装置 33 只接受提出全屏幕模式要求的第一电子装置 31 或第二电子装置 32 所传送的预定显示信息(S706)。判断提出全屏幕模式要求的第一电子装置 31 或第二电子装置 32 是否要求结束全屏幕模式(S707)，若否，重复步骤 S706，若是，处理装置 33 将原先显示区域的分配状态通知第一电子装置 31 以及第二电子装置 32(S708)。第一电子装置 31 以及第二电子装置 32 即以原先显示区域的几何信息调整并传送预定显示信息(S709)。需注意的是，在进入全屏幕模式时，处理装置可传送一失效命令，使其余未提出要求的第一电子装置 31 以及第二电子装置 32 的全屏幕模式要求失效，以避免在全屏幕模式时，有其它电子装置提出全屏幕模式的要求。举例而言，请参照图 9，当传送端 Thomas 压下按钮 921 来启动全屏幕模式时，其余传送端的按钮 921 即失效，无法再执行全屏幕模式要求。

本发明优选实施例的以局域网多对一传输并显示信息的系统 3 如图 3 所示，其包含一第一电子装置 31、至少一第二电子装置 32、至少一处理装置 33 以及一输出装置 34。第一电子装置 31、第二电子装置 32 以及处理装置 33 彼此信号连接而组成一局域网。该局域网可为一有线或无线局域网。处理装置 33 以及输出装置 34 以有线或无线方式信号连接，也可以直接整合在一起。输出装置 34 用以显示信息，其可为一投影仪、屏幕或电视等。

第一电子装置 31、第二电子装置 32 以及处理装置 33 执行前述方法的步骤，在此不再赘述。以本发明的系统应用于无线局域网为例，第一电子装置 31、第二电子装置 32 以及处理装置 33 可为电脑、个人数字助理(Personal Digital Assistant，PDA)，移动电话(Mobile Phone)

等，也可以为无线投影仪转换器(Wireless Projector Adapter)、无线机顶盒(Wireless Setup Box)、无线数字媒体转换器（Wireless Digital Media Adapter，Wireless DMA）、无线光盘播放器(Wireless Optical Disc Player)、无线 DVD 播放器(Wireless DVD Player)、无线录影机(Wireless Video Recorder)、无线游戏机(Wireless Game Console)、无线便携式媒体播放器(Wireless Portable Media Player)等。

依据本发明的以局域网多对一传输并显示信息的方法及系统，其在传送预定显示信息前，先针对显示区域的几何大小进行调整，有效降低传输的数据量，因此可有效减少网络带宽的消耗。此外，预定显示信息已先由第一电子装置以及第二电子装置依照显示区域的大小进行调整，处理装置仅需要直接将其整合成一个显示画面即可，因此大大降低信息整合端(即本发明的处理装置)处理画面整合的运算量，因而能够以运算处理能力相对较差的硬件来执行本发明，以降低成本。

以上所述仅为举例性的，而非限制性的。任何本领域技术人员均可依据上述本发明的实施例进行等效的修改，而不脱离其精神与范畴。故任何未脱离本发明的精神与范畴，而对其进行的等效修改或变更，均应包含于所附的权利要求范围中。

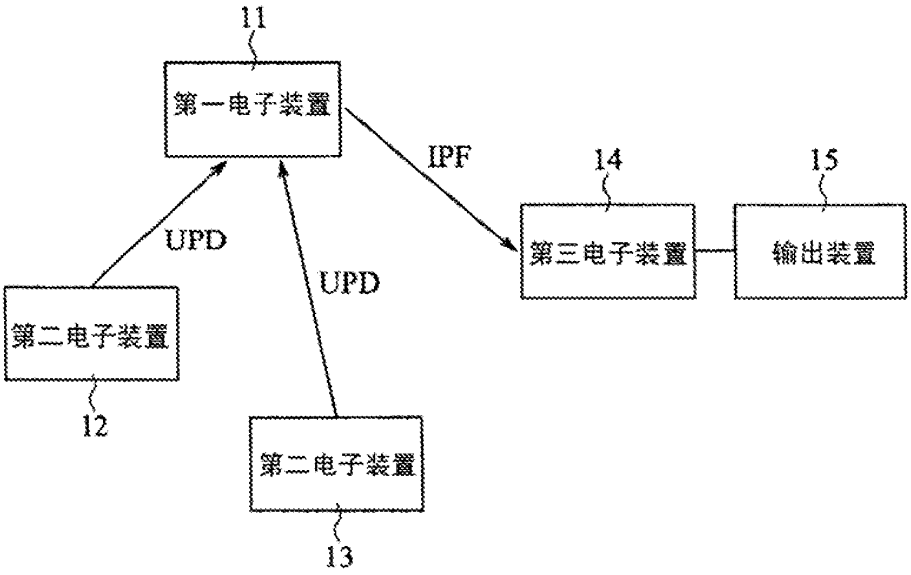


图1

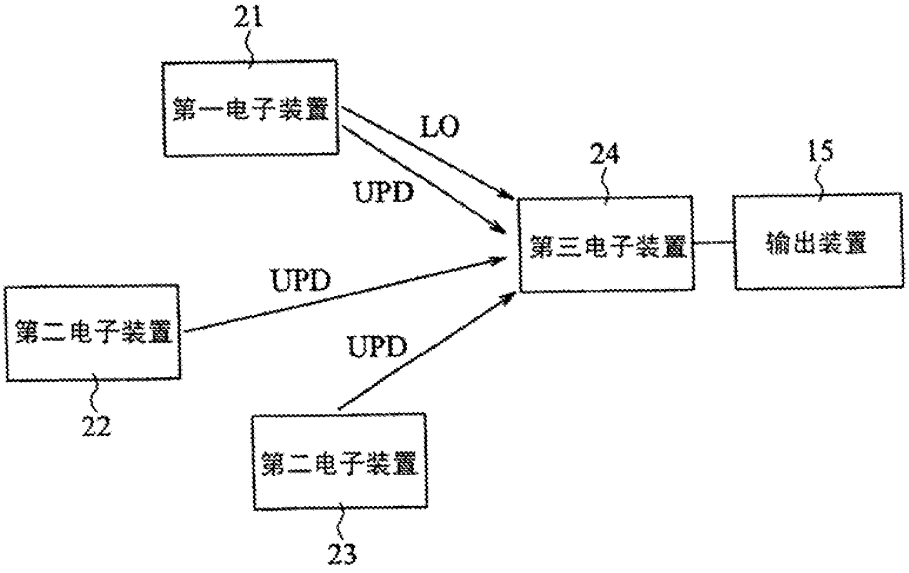


图2

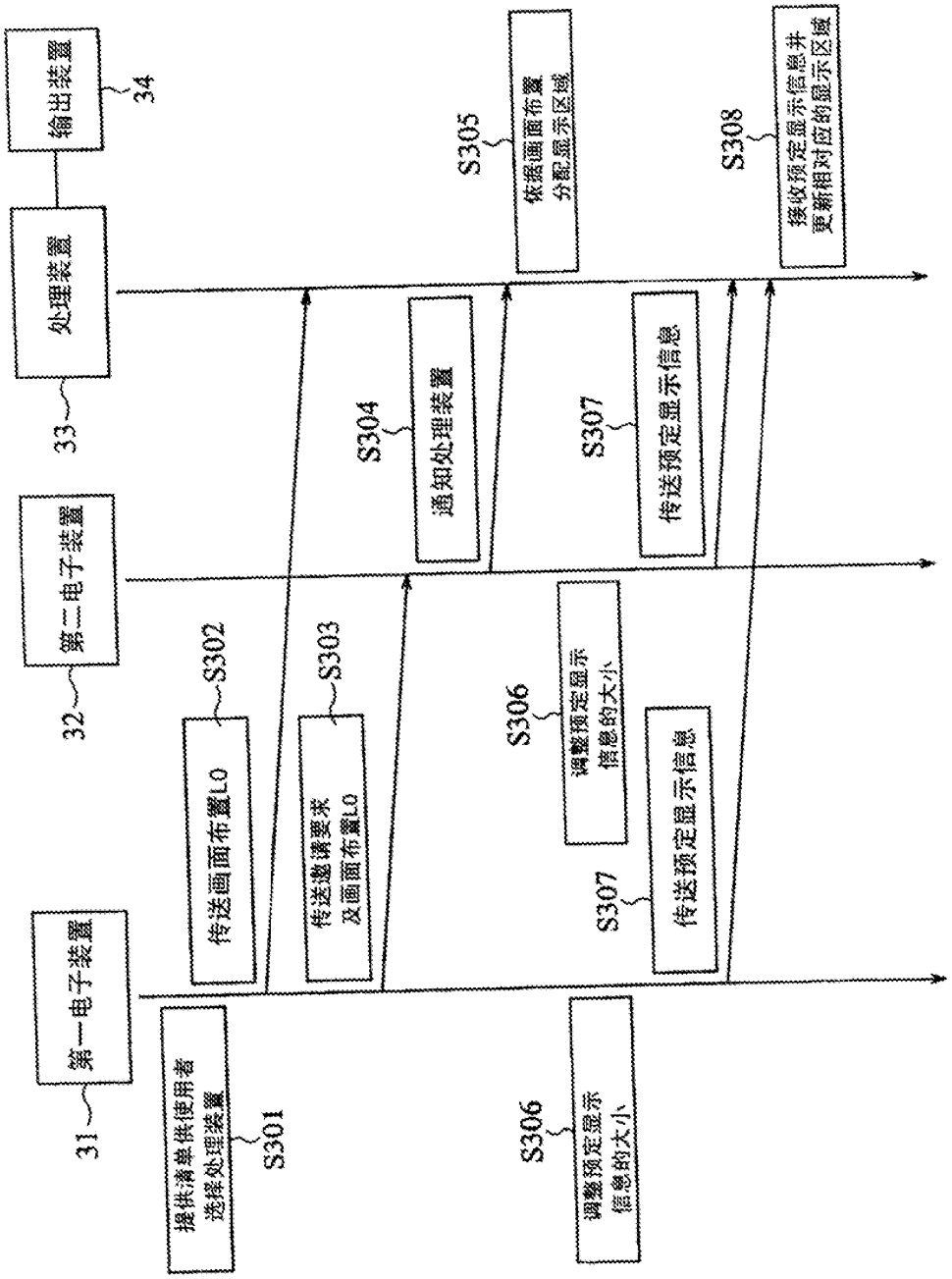

第一电子装置
31
第二电子装置
32
处理装置
33
输出装置
34
提供清单供使用者选择处理装置
S301
传送画面布置LO
S302
传送邀请要求及画面布置LO
S303
通知处理装置
S304
依据画面布置分配显示区域
S305
调整预定显示信息的大小
S306
传送预定显示信息
S307
接收预定显示信息并更新相对应的显示区域
S308
调整预定显示信息的大小
S306
传送预定显示信息
S307

图3

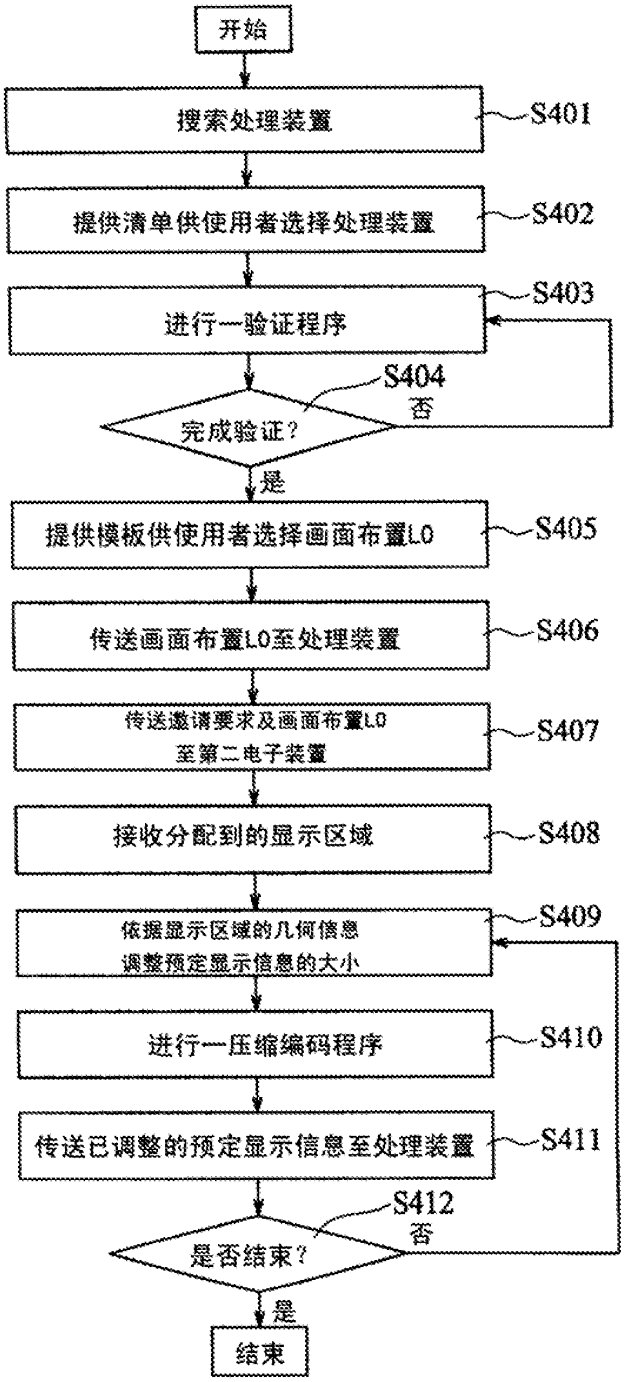

开始
搜索处理装置
S401
提供清单供使用者选择处理装置
S402
进行一验证程序
S403
完成验证？
S404
否
是
提供模板供使用者选择画面布置L0
S405
传送画面布置L0至处理装置
S406
传送邀请要求及画面布置L0
至第二电子装置
S407
接收分配到的显示区域
S408
依据显示区域的几何信息
调整预定显示信息的大小
S409
进行一压缩编码程序
S410
传送已调整的预定显示信息至处理装置
S411
是否结束？
S412
否
是
结束

图4

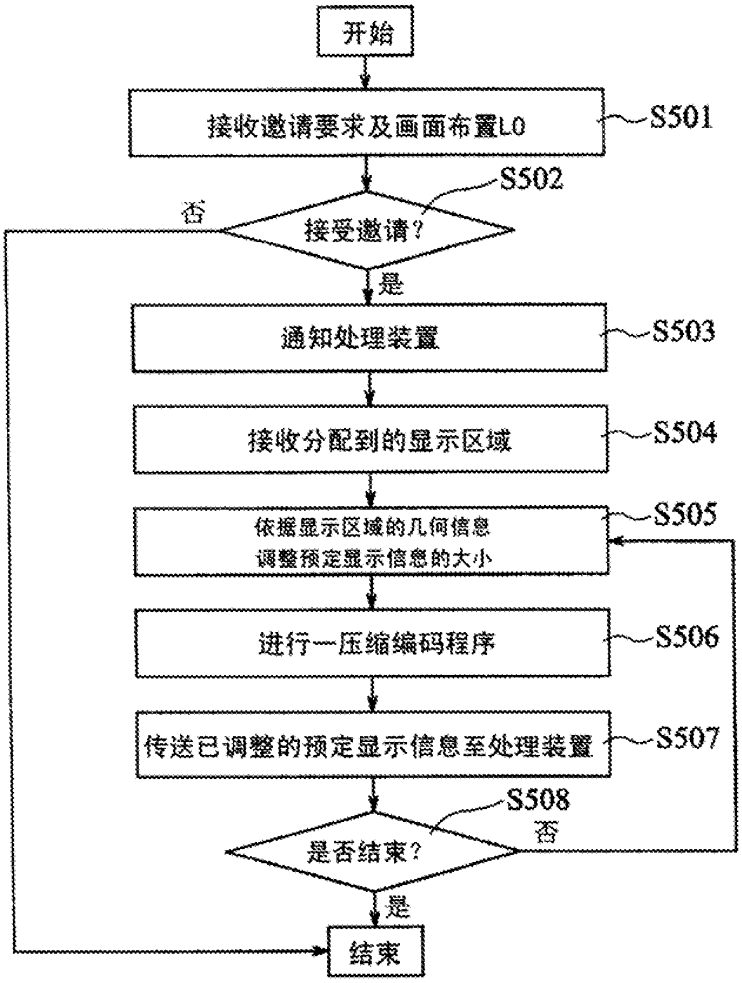

开始
接收邀请要求及画面布置L0
S501
S502
否
接受邀请?
是
通知处理装置
S503
接收分配到的显示区域
S504
依据显示区域的几何信息
调整预定显示信息的大小
S505
进行一压缩编码程序
S506
传送已调整的预定显示信息至处理装置
S507
S508
否
是否结束?
是
结束

图5

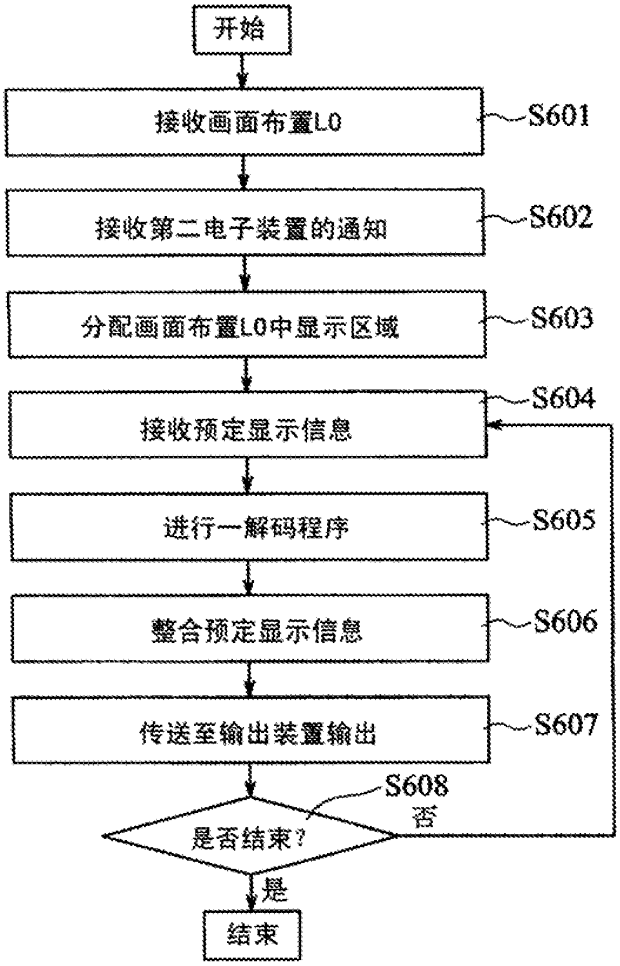

开始
接收画面布置L0
S601
接收第二电子装置的通知
S602
分配画面布置L0中显示区域
S603
接收预定显示信息
S604
进行一解码程序
S605
整合预定显示信息
S606
传送至输出装置输出
S607
是否结束?
S608
否
是
结束

图6

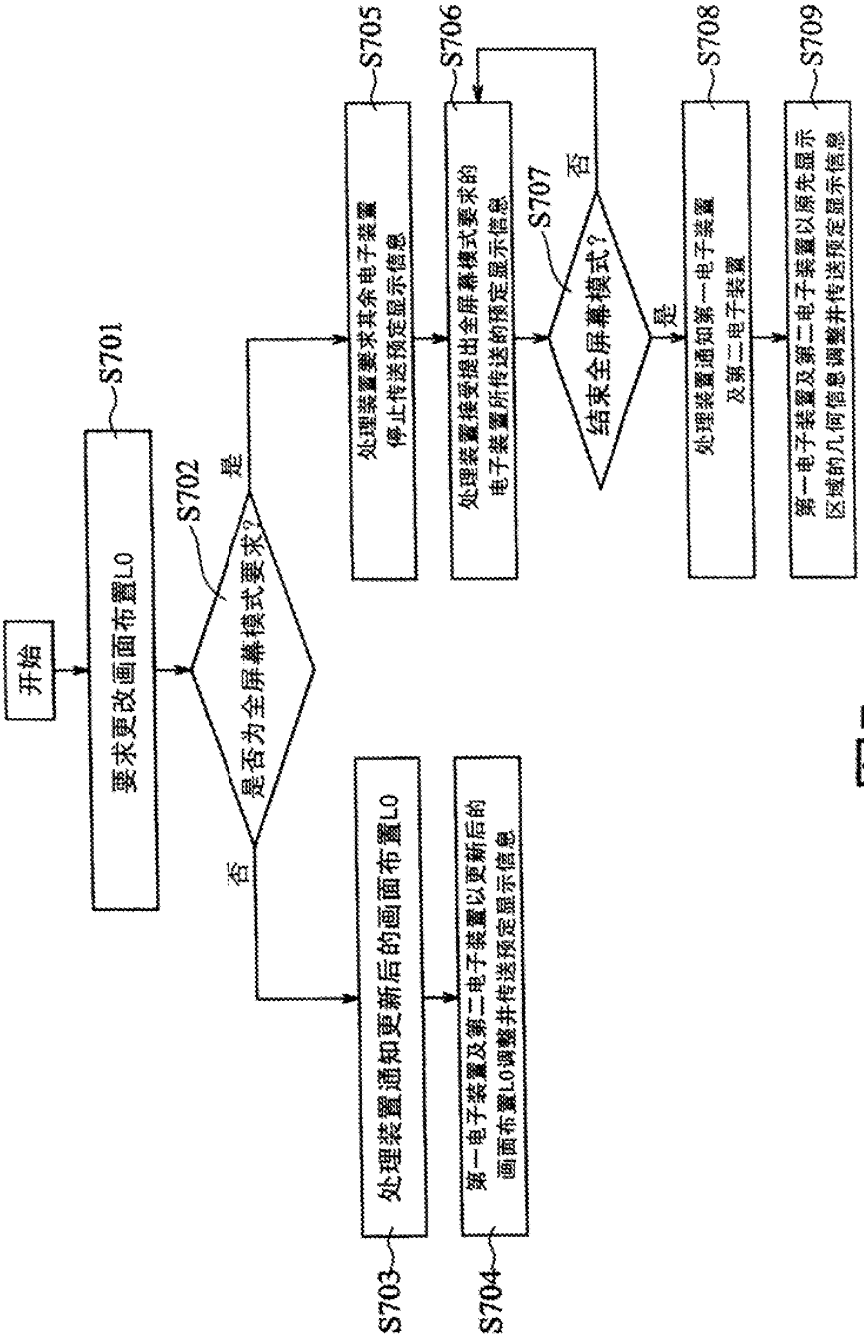

开始
要求更改画面布置L0
S701
S702
是否为全屏幕模式要求?
是
否
S705
处理装置要求其余电子装置
停止传送预定显示信息
S706
处理装置接受提出全屏幕模式要求的
电子装置所传送的预定显示信息
S707
结束全屏幕模式?
否
是
S708
处理装置通知第一电子装置
及第二电子装置
S709
第一电子装置及第二电子装置以原先显示
区域的几何信息调整并传送预定显示信息
S703
处理装置通知更新后的画面布置L0
S704
第一电子装置及第二电子装置以更新后的
画面布置L0调整并传送预定显示信息

图7

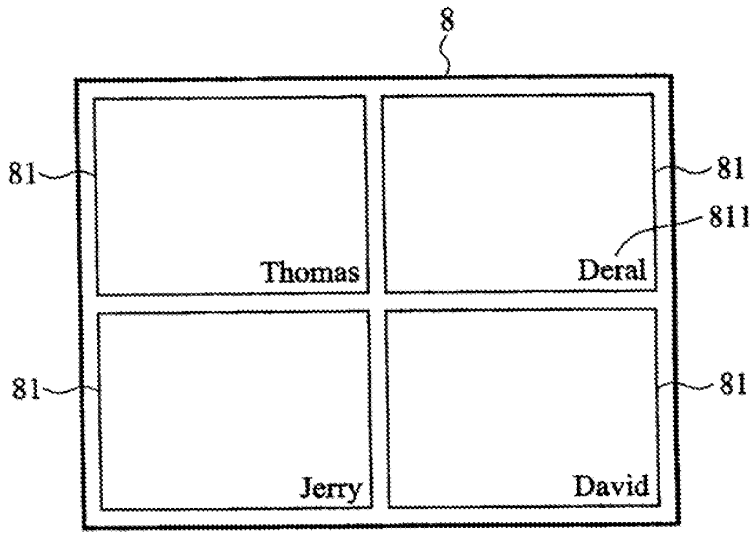


图8

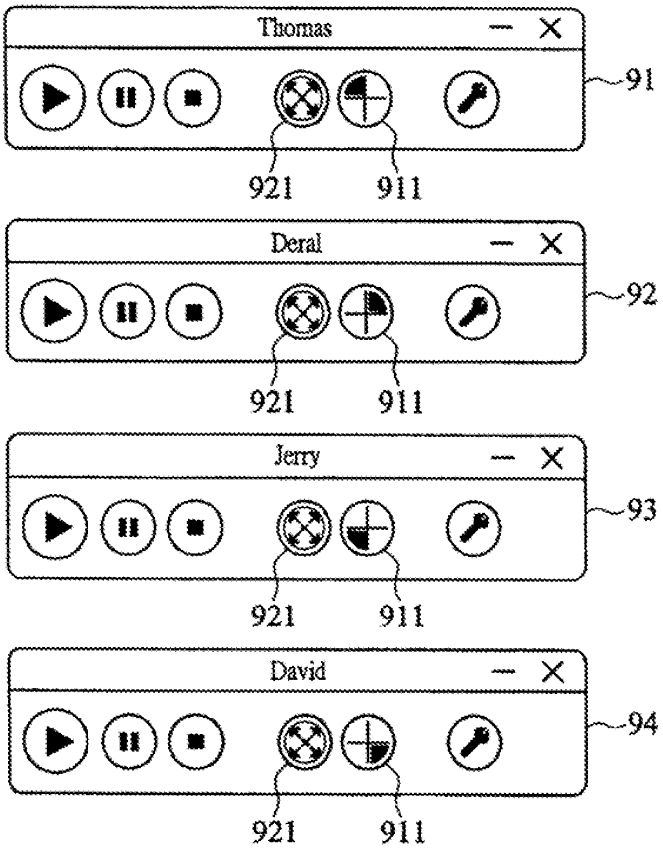

Thomas
91
921
911
Deral
92
921
911
Jerry
93
921
911
David
94
921
911

图9

Espacenet

Bibliographic data: CN101106469 (A) — 2008-01-16

Control system and method for multi-party demonstration manuscript conference

Inventor(s): GUOLONG ZHANG [CN]; BOWEN ZHENG [CN]; XIANGLI CHEN [CN] ± (ZHANG GUOLONG, ; ZHENG BOWEN, ; CHEN XIANGLI)

Applicant(s): AWIND INC [CN] ± (AWIND INC, ; CHIANTI NET BRANCH CO., LTD)

Classification:

- **international:** ***G06F15/163; G06F21/00; G06Q10/00; G06Q30/00; G07F17/16; G09C1/00; H03M13/23; H03M13/27; H03M13/29; H04B1/00; H04B1/69; H04B1/707; H04B14/04; H04B7/005; H04B7/02; H04B7/06; H04B7/08; H04B7/216; H04B7/26; H04J13/02; H04K1/00; H04L1/00; H04L1/06; H04L1/08; H04L1/18; H04L12/18; H04L12/28; H04L12/56; H04L27/26; H04L29/06; H04L29/08; H04L29/14; H04L9/06; H04L9/10; H04L9/14; H04L9/32; H04W52/48;*** *H04J13/00; H04W48/16; H04W8/00*
- **cooperative:** **G06F21/6245**; **G06Q20/10**; **G06Q20/1235**; **G06Q20/385**; **G06Q20/401**; **G06Q20/425**; **G06Q30/0277**; **G06Q30/0609**; **G06Q50/188**; **G07F17/16**; **H04B7/0604**; **H04B7/084**; **H04B7/15535**; **H04J13/12**; **H04L1/0041**; **H04L1/0045**; **H04L1/0066**; **H04L1/0069**; **H04L1/0071**; **H04L1/06**; **H04L1/08**; **H04L1/1819**; **H04L1/1841**; **H04L1/1848**; **H04L12/2856**; **H04L12/2874**; **H04L27/2602**; **H04L41/12**; **H04L47/10**; **H04L47/14**; **H04L47/28**; **H04L47/34**; **H04L5/0023**; **H04L5/0042**; **H04L5/0044**; **H04L5/0083**; **H04L63/0428**; **H04L63/065**; **H04L63/08**; **H04L63/0807**; **H04L63/102**; **H04L63/1441**; **H04L67/14**; **H04L67/16**; **H04L67/306**; **H04L69/16**; **H04L69/168**; **H04L9/32**; **H04W28/14**; **H04W52/143**; **H04W52/24**; **H04W52/245**; **H04W52/46**; **H04W52/48**; H04B7/0894; H04B7/15507; H04L1/1845; H04L2001/0096; H04L2209/127; H04L69/324; H04W48/16; H04W52/225; H04W52/241; H04W52/242; H04W8/005; Y10S707/99933; Y10S707/99936; Y10S707/99939

Electronic Acknowledgement Receipt

EFS ID:	28354375
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:	15-FEB-2017
Filing Date:	03-MAR-2015
Time Stamp:	11:03:37
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_filing.pdf	613030 45476e0ba02251d56d9468c011e8d20e2ceb3c92	no	5

Warnings:

Information:					
2	Non Patent Literature	BEEL3001C_FOA_26JAN17.pdf	813769 62c485d150b4bfd776e4117d6677448b566caa79	no	20
Warnings:					
Information:					
3	Non Patent Literature	BEEL3002CIPC_FOA_26JAN17.pdf	963170 3ebdf3504deaffbd5656a1130b759c9283c7e979	no	24
Warnings:					
Information:					
4	Non Patent Literature	CN_OA_27DEC16_filing.pdf	7838598 c6c2143b94d71a4a8de149d14f34f61db7408a8c	no	23
Warnings:					
Information:					
5	Foreign Reference	CN1499841A.pdf	4464456 feb713879c5b8e3bad38f84383e12eb1c7d14573	no	92
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Information:					

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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	2181
Examiner Name	Henry Tsai
Attorney Docket Number	BEEL3004/BEU/TL

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	1	20020174254	A1	2002-11-21	KITA et al.	corresponds to CN 1689275

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	1	1689275	CN	A	2005-10-26	SONY CORP	English abstract, corresponds to US 20020174254	X

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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	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2181
	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

	1	Chinese Office Action dated November 4, 2016, for CN 201280001542.X, and English translation thereof.	

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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	2181
	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

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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.

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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 Lee/	Date (YYYY-MM-DD)	2017-02-03
Name/Print	THOMAS LEE	Registration Number	66396

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Bibliographic data: CN1689275 (A) — 2005-10-26

Card type network interface, network conference terminal device and network conference system

Inventor(s): KAZUHIRO KITA [JP]; MIWAKO YUASA [JP] ± (KITA KAZUHIRO, ; YUASA MIWAKO)

Applicant(s): SONY CORP [JP] ± (SONY CORP)

Classification: - international: ***G06F13/00; G06F13/10; H04L12/28; H04M3/56; H04N7/14;*** *H04M7/00;* (IPC1-7): H04L12/28
- cooperative: **H04M3/567; H04N7/142; H04N7/148; H04W28/18;** H04M2207/18; H04M7/006; H04W84/12

Application number: CN2001801762 20010516

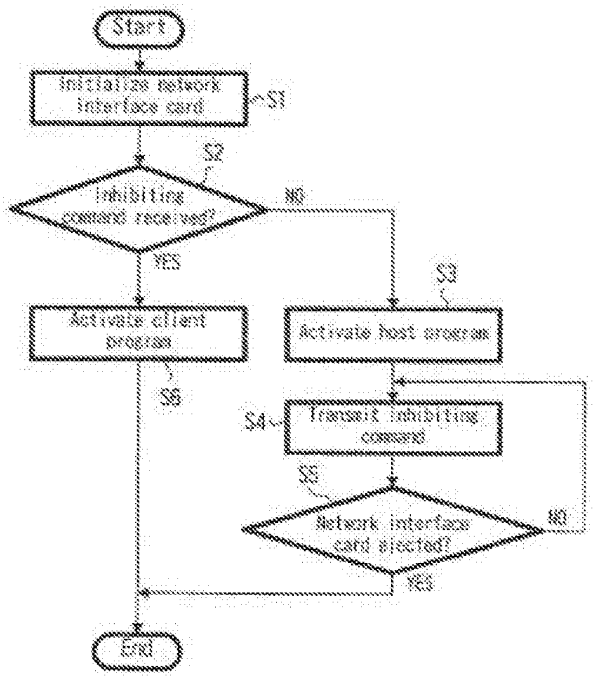
Priority number(s): JP20000143822 20000516

Also published as: CN100508473 (C) US2002174254 (A1) US2004006648 (A9) US6917964 (B2) TWI242137 (B) more

Abstract not available for CN1689275 (A)
Abstract of corresponding document: US2002174254 (A1)

A wireless LAN conference system can be constructed without increasing the cost of equipment of a conference hall and without imposing a burden upon participants to execute a network setting. There are provided network conference terminal devices 11(2) to 11(n) in which network interface cards 1 are attached to information terminal devices.; The network interface card 1 includes a connecting means for connecting the information terminal device to a wireless LAN, a determining means for determining whether the information terminal device is served as a host or a client of the wireless LAN, a setting means for requesting the host to transmit setting information necessary for executing the network setting to connect the information terminal device to the wireless LAN based on the fact that the information terminal device is determined as the client and executing the network setting by using the setting information transmitted from the host and a processing means for transmitting a requested setting information to the client based on the fact that the information terminal device is determined as the host and transmitting presentation data to the client in which the network setting was

completed.


Start
Initialize network interface card
S1
S2
Inhibiting command received?
NO
YES
S3
Activate client program
Activate host program
S6
S4
Transmit inhibiting command
S5
Network interface card elected?
NO
YES
End

[19] 中华人民共和国国家知识产权局

[51] Int. Cl[7]
H04L 12/28
H04L 29/06
H04L 12/18

[12] 发明专利申请公开说明书

[21] 申请号 01801762.2

[43] 公开日 2005 年 10 月 26 日

[11] 公开号 CN 1689275A

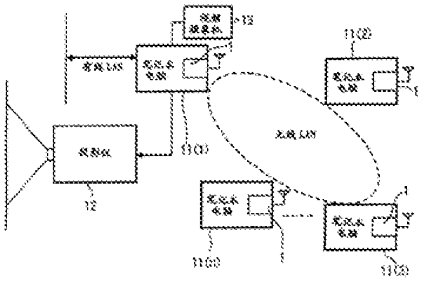
[22] 申请日 2001.5.16 [21] 申请号 01801762.2
[30] 优先权
[32] 2000.5.16 [33] JP [31] 143822/2000
[86] 国际申请 PCT/JP2001/004082 2001.5.16
[87] 国际公布 WO2001/089156 英 2001.11.22
[85] 进入国家阶段日期 2002.2.21
[71] 申请人 索尼株式会社
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[54] 发明名称 卡式网络接口、网络会议终端设备和网络会议系统

[57] 摘要

一种无线 LAN 会议系统，无需增加会议室的设备成本，也无需强制参与者执行网络设置，就能构建该会议系统。提供网络会议终端设备 11(2)到 11(n)，在这些终端设备内将网络接口卡 1 连接到信息终端设备。网络接口卡 1 包括：连接装置，用于将信息终端设备连接到无线 LAN；确定装置，用于确定信息终端设备为无线 LAN 的主机还是客户机；设置装置，用于请求主机传送执行网络设置所需的设置信息，以便基于将信息终端设备确定为客户机的事实，将信息终端设备连接到无线 LAN，并且通过使用主机传送的设置信息，执行所述网络设置；以及处理装置，基于将信息终端设备确定为主机的事实，向客户机传送请求的设置信息，并且向完成网络设置的客户机传送演示数据。



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1. 一种能够连接到信息终端设备的卡式网络接口，包括:

连接装置，用于将所述信息终端设备连接到一个局域网；以及

设置装置，用于请求所述局域网的一个主机传送设置信息，该设置信息是根据将所述卡式网络接口连接到所述信息终端设备的事实而执行网络设置以便将所述信息终端设备连接到所述局域网以及通过使用所述主机传送的所述设置信息而执行所述网络设置所必需的。

2. 根据权利要求 1 的卡式网络接口，还包括:

确定装置，用于基于将所述卡式网络接口连接到所述信息终端设备的事实，确定所述信息终端设备是作为所述局域网的主机还是客户机；以及

处理装置，如果所述确定装置确定所述信息终端设备作为所述主机，则向所述客户机传送所所述请求的设置信息，如果所述确定装置确定所述信息终端设备作为所述客户机，则所述设置装置请求所述设置信息。

3. 根据权利要求 1 的卡式网络接口，其中在所述卡式网络接口中，存储用于显示和控制演示数据的演示应用程序软件。

4. 根据权利要求 3 的卡式网络接口，其中所述信息终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述信息终端设备将所述卡式网络接口识别为硬盘，从而在所述信息终端设备中自动启动所述演示应用程序软件。

5. 根据权利要求 2 的卡式网络接口，其中基于将所述卡式网络接口连接到所述信息终端设备的事实，如果通过所述局域网并未收到禁止将所述信息终端设备确定为所述主机的命令，则所述确定装置确定所述信息终端设备为所述主机，并且通过所述局域网传送禁止将所述其他信息终端设备确定为所述主机的命令。

6. 根据权利要求 2 的卡式网络接口，还包括:

处理装置，用于基于所述确定装置确定所述信息终端设备为所述客户机，由所述设置装置完成所述网络设置以及由所述信息终端设备执行预

定操作的事实，请求所述主机获得演示权限，并且基于获得所述演示权限的事实，向所述主机和所述其他客户机传送演示数据；以及

处理装置，用于基于所述确定装置确定所述信息终端设备为所述主机，并且请求所述主机获得所述演示权限的事实，允许所述客户机获得所述演示权限。

7. 根据权利要求 2 的卡式网络接口，其中所述连接装置还包括处理装置，用于将所述信息终端设备连接到无线局域网，基于所述确定装置将所述信息终端设备确定为所述主机的事实，在轮询系统中接收已完成所述网络设置的所述客户机的请求，并且在轮询周期结束时等待所述设置信息的请求，其中所述设置装置在所述轮询周期结束时请求所述设置信息。

8. 根据权利要求 2 的卡式网络接口，其中在所述卡式网络接口中，存储用于显示和控制演示数据的演示应用程序软件。

9. 根据权利要求 8 的卡式网络接口，其中所述信息终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述信息终端设备将所述卡式网络接口识别为硬盘，从而在所述信息终端设备中自动启动所述演示应用程序软件。

10. 一种网络会议终端设备，其中将卡式网络接口连接到信息终端设备，网络会议终端设备包括演示处理装置，用于根据需要显示和控制演示数据，所述卡式网络接口包括：

连接装置，用于将所述信息终端设备连接到无线局域网；以及

设置装置，用于请求所述无线局域网的主机传送设置网络所需的设置信息，以便基于将所述卡式网络接口连接到所述信息终端设备的事实，将所述信息终端设备连接到所述无线局域网，并且用于通过使用所述主机传送的所述设置信息执行所述网络设置。

11. 根据权利要求 10 的网络会议终端设备，其中所述卡式网络接口还包括：

确定装置，用于基于将所述卡式网络接口连接到所述信息终端设备的事实，确定所述信息终端设备是作为所述无线局域网的主机还是客户机；

以及

处理装置，如果所述确定装置确定所述信息终端设备作为所述主机，则向所述客户机传送所述请求的设置信息，并且向完成所述网络设置的客户机传送所述演示数据，如果所述确定装置确定所述信息终端设备作为所述客户机，则所述设置装置请求所述设置信息。

12. 根据权利要求 10 的网络会议终端设备，其中通过执行所述卡式网络接口中存储的演示应用程序软件，所述演示处理装置显示所述演示数据。

13. 根据权利要求 12 的网络会议终端设备，其中所述信息终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述信息终端设备将所述卡式网络接口识别为硬盘，从而在所述信息终端设备中自动启动所述演示应用程序软件。

14. 根据权利要求 11 的网络会议终端设备，其中基于将所述卡式网络接口连接到所述信息终端设备的事实，如果通过所述无线局域网并未收到禁止将所述信息终端设备确定为所述主机的命令，则所述确定装置确定所述信息终端设备为所述主机，并且通过所述无线局域网传送禁止将所述其他信息终端设备确定为所述主机的命令。

15. 根据权利要求 11 的网络会议终端设备，其中所述卡式网络接口还包括:

处理装置，用于基于所述确定装置确定所述终端设备为所述客户机，由所述设置装置完成所述网络设置以及由所述终端设备执行预定操作的事实，请求所述主机获得演示权限，并且基于获得所述演示权限的事实，向所述主机和所述其他客户机传送所述演示数据；以及

处理装置，用于基于将所述终端设备确定为所述主机，并且请求所述主机获得所述演示权限的事实，允许所述客户机获得所述演示权限。

16. 根据权利要求 11 的网络会议终端设备，其中所述卡式网络接口还包括:

处理装置，基于所述确定装置将所述终端设备确定为所述主机的事实，在轮询系统中接收已完成所述网络设置的所述客户机的请求，并且

在轮询周期结束时等待所述设置信息的请求，其中所述设置装置在所述轮询周期结束时请求所述设置信息。

17. 根据权利要求 11 的网络会议终端设备，其中通过执行所述卡式网络接口中存储的演示应用程序软件，所述演示处理装置显示所述演示数据。

18. 根据权利要求 17 的网络会议终端设备，其中所述信息终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述信息终端设备将所述卡式网络接口识别为硬盘，从而在所述信息终端设备中自动启动所述演示应用程序软件。

19. 一种网络会议系统，包括:

无线局域网的一台主机;

一个所述无线局域网的一台客户机，其中所述客户机包括连接卡式网络接口的信息终端设备，以及根据需要显示和控制演示数据的演示处理装置，所述卡式网络接口包括，连接装置，用于将所述信息终端设备连接到所述无线局域网，和设置装置，用于请求所述主机传送执行网络设置所需的设置信息，以便基于将所述卡式网络接口连接到所述信息终端设备的事实，将所述信息终端设备连接到所述无线局域网，并且用于通过使用所述主机传送的所述设置信息，执行所述网络设置，所述主机基于所述设置信息的请求向所述客户机传送所述设置信息，并且向完成所述网络设置的所述客户机传送所述演示数据。

20. 根据权利要求 19 的网络会议系统，其中所述卡式网络接口还包括:

确定装置，用于基于将所述卡式网络接口连接到所述信息终端设备的事实，确定所述信息终端设备是作为所述无线局域网的主机还是客户机;以及

处理装置，如果所述确定装置确定所述信息终端设备作为所述主机，则向所述客户机传送所述请求的设置信息，并且向完成所述网络设置的所述客户机传送所述演示数据，如果所述确定装置确定所述信息终端设备作为所述客户机，并且所述主机为以下主机，即所述确定装置确定连

接所述卡式网络接口的信息终端设备为主机的主机，则所述设置装置请求所述设置信息。

21. 根据权利要求 19 的网络会议系统，其中通过执行所述卡式网络接口中存储的演示应用程序软件，所述演示处理装置显示所述演示数据。

22. 根据权利要求 21 的网络会议系统，其中所述信息终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述信息终端设备将所述卡式网络接口识别为硬盘，从而在所述信息终端设备中自动启动所述演示应用程序软件。

23. 根据权利要求 20 的网络会议系统，其中基于将所述卡式网络接口连接到所述信息终端设备的事实，如果通过所述无线局域网并未收到禁止将所述信息终端设备确定为所述主机的命令，则所述确定装置确定所述信息终端设备为所述主机，并且通过所述无线局域网传送禁止将所述其他信息终端设备确定为所述主机的命令。

24. 根据权利要求 20 的网络会议系统，其中所述卡式网络接口还包括:

处理装置，用于基于所述确定装置确定所述终端设备为所述客户机，由所述设置装置完成所述网络设置以及由所述终端设备执行预定操作的事实，请求所述主机获得演示权限，并且基于获得所述演示权限的事实，向所述主机和所述其他客户机传送所述演示数据；以及

处理装置，用于基于所述确定装置确定所述卡式网络接口为所述主机，并且请求所述主机获得所述演示权限的事实，允许所述客户机获得所述演示权限。

25. 根据权利要求 20 的网络会议系统，其中所述卡式网络接口还包括处理装置，用于基于所述确定装置确定所述卡式网络接口为所述主机的事实，在轮询系统中接收已完成所述网络设置的所述客户机的请求，并且在轮询周期结束时等待所述设置信息的请求，其中所述设置装置在所述轮询周期结束时请求所述设置信息。

26. 根据权利要求 20 的网络会议系统，其中通过执行所述卡式网络接口中存储的演示应用程序软件，所述演示处理装置显示所述演示数据。

27. 根据权利要求 26 的网络会议系统，其中所述终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述终端设备将所述卡式网络接口识别为硬盘，从而在所述终端设备中自动启动所述演示应用程序软件。

28. 一种网络会议系统，包括一台图像显示设备和无线局域网的一台客户机，其中所述图像显示设备具有一台能够连接卡式网络接口的信息终端设备，所述信息终端设备连接有所述卡式网络接口，并且包括用于显示和控制演示数据的演示处理装置；

构造所述客户机以至将所述卡式网络接口连接到信息终端设备，并且所述客户机包括与需求相应的所述演示处理装置；

所述卡式网络接口包括：

连接装置，用于将所述信息终端设备连接到无线局域网；

确定装置，用于基于将所述卡式网络接口连接到所述信息终端设备的事实，确定所述信息终端设备是作为所述无线局域网的主机还是客户机；

设置装置，用于请求所述主机传送执行网络设置所需的设置信息，以便基于所述确定装置确定所述信息终端设备为所述客户机，以及通过使用所述主机传送的所述设置信息执行所述网络设置的事实，将所述信息终端设备连接到所述无线局域网；

处理装置，用于基于所述确定装置确定所述信息终端设备为所述主机的事实，向所述客户机传送所述请求的设置信息，并且向完成所述网络设置的所述客户机，传送所述演示数据；

处理装置，用于基于所述确定装置确定所述终端设备为所述客户机，由所述设置装置完成所述网络设置以及由所述终端设备执行预定操作的事实，请求所述主机获得演示权限，并且基于获得所述演示权限的事实，向所述主机和所述客户机传送所述演示数据；以及

处理装置，用于基于所述确定装置确定所述信息终端设备为所述主机，请求所述主机获得所述演示权限，并且构造所述图像显示设备以至所述确定装置确定连接所述图像显示设备的所述信息终端设备为主机的事实，允许所述客户机获得所述演示权限。

29. 根据权利要求 28 的网络会议系统，其中基于将所述卡式网络接口连接到所述信息终端设备的事实，如果通过所述无线局域网并未收到禁止将所述信息终端设备确定为所述主机的命令，则所述确定装置确定所述信息终端设备为所述主机，并且通过所述无线局域网传送禁止将所述其他信息终端设备确定为所述主机的命令。

30. 根据权利要求 28 的网络会议系统，其中所述卡式网络接口还包括处理装置，用于基于所述确定装置确定所述卡式网络接口为所述主机的事实，在轮询系统中接收已完成所述网络设置的所述客户机的请求，并且在轮询周期结束时等待所述设置信息的请求，其中所述设置装置在所述轮询周期结束时请求所述设置信息。

31. 根据权利要求 28 的网络会议系统，其中通过执行所述卡式网络接口中存储的演示应用程序软件，所述演示处理装置显示所述演示数据。

32. 根据权利要求 31 的网络会议系统，其中所述终端设备自动启动硬盘中存储的能够自动启动的应用程序软件，并且所述卡式网络接口允许所述终端设备将所述卡式网络接口识别为硬盘，从而在所述终端设备中自动启动所述演示应用程序软件。

卡式网络接口、网络会议终端设备和网络会议系统

技术领域

本发明涉及与诸如个人计算机之类的信息终端设备相连的卡式网络接口，使用此类卡式网络接口的网络会议终端设备，以及使用此类网络会议终端设备的网络会议系统。

背景技术

作为基于 PCMCIA（个人计算机存储卡接口适配器）标准的 PC 卡并且能够将个人计算机连接到 LAN（局域网）的网络 I/F（接口）卡越来越普及。当将此类网络接口卡插入到个人计算机的 PC 卡插槽时，可以将个人计算机连接到 LAN。

为了将一台个人计算机（以下称为“个人计算机”）连接到 LAN，必须预先执行将个人计算机连接到 LAN 的设置操作（以下称为“网络设置”）。网络设置包含个人计算机在 LAN 中的 IP 地址（用于控制路径的标识信息和位置信息）设置，以及 DNS 服务器（用于提供 IP 地址和域名之间的转换的服务器）的 IP 地址设置。

图 1 表示一台个人计算机，该计算机连接有常规网络接口卡，以下参照此类个人计算机解释用于执行以上网络设置的部分功能。在个人计算机的操作系统（如，Windows 95 或 Windows 98（“Windows”为注册商标））中，支持网络功能。该网络功能包括为根据用户的输入操作执行网络设置而显示网络设置画面的功能。

另一方面，作为控制常规网络接口卡的软件的设备驱动程序并不包含网络设置功能。为此，通过使用个人计算机的操作系统的网络功能执行个人计算机的网络设置。

图 2 表示用户将图 1 所示的个人计算机连接到 LAN 时执行的工作程序。用户将网络接口卡插入到个人计算机中，然后启动个人计算机的操作系统，以便在个人计算机的屏幕上显示控制面板。然后，用户从控制

面板中选择网络设置图标，并根据用户选择相应图标时显示的网络设置画面上的说明，输入数据。此后，用户重新启动操作系统完成网络设置。

如上所述，为了将常规网络接口卡连接到个人计算机，以便将个人计算机连接到 LAN，用户必须启动个人计算机的操作系统执行网络设置操作。因此，不太了解操作系统的用户难以理解上述操作。例如，当携带笔记本电脑到达不同位置并连接到 LAN 时，需要在每个位置执行上述操作，因此，对于非常了解操作系统的用户，上述操作也很麻烦。

在操作系统支持 DHCP 的情况中，由于操作系统端自动执行网络设置处理，所以用户无需执行网络设置操作，其中 DHCP 为能够管理信息以便以集中方式执行网络设置的协议。然而，实际上，大部分用户的个人计算机的操作系统并不支持 DHCP。

考虑到以上方面，本发明要解决的第一个问题是，当将网络接口卡连接到个人计算机以便将个人计算机连接到 LAN 时，即使个人计算机的操作系统不支持 DHCP，也能够在不麻烦用户的情况下执行网络设置操作。

另一方面，迄今为止，在诸如会议、演示、学术会议（在本说明书中，会议、演示和学术会议统称为“会议”）之类的各种场合中，通过在投影仪上显示诸如图像和插图之类演示数据进行演示。然而，取决于会议厅的大小以及投影仪的屏幕的大小，其座位远离投影仪的人员通常看不清楚投影仪和显示的演示数据。

近几年来，在与会议厅中各座位上的 LAN 插口相连的个人计算机上显示演示数据的形式越来越普遍。如上所述，如果通过有效地利用 LAN 举行会议，则所有座位上的参与者均能满意地观看演示数据。

然而，如果作为设备在每个座位上安装个人计算机，则不可避免地要增加会议室中的设备成本。如果将与会者携带的笔记本电脑连接到会议室内的 LAN，则能够避免增加设备成本。如果是那样的话，则参与者必须执行令人厌烦的网络设置操作。

考虑到上述方面，本发明要解决的第二个问题是，在不增加会议室的设备成本的情况下，并且在不向参与者强加网络设置负担的情况下，构建使用 LAN 的会议系统。

为了解决以上第一个问题，建议采用与诸如个人计算机之类的信息终端设备相连的卡式网络接口。卡式网络接口包括：一个连接装置，用于将信息终端设备连接到 LAN；以及一个设置装置，用于请求 LAN 的主机传送设置信息。设置信息用于设置网络以便将信息终端设备连接到 LAN，并且基于将卡式网络接口连接到信息终端设备的事实，通过使用主机传送的设置信息设置网络。

卡式网络接口不仅包括用于将信息终端设备连接到 LAN 的连接装置（即，将信息终端设备连接到 LAN 的功能），而且包括用于设置网络的设置装置。因此，当将此卡连接到信息终端设备时，设置装置请求 LAN 的主机传送设置网络所需的设置信息，并通过使用主机传送的设置信息设置网络。

如上所述，当将卡式网络接口连接到信息终端设备时，由于由设置装置自动设置网络，所以无需麻烦用户就能设置网络。

因此，例如，在使用 LAN 的会议中，如果在会议室中配备卡式网络接口，并且将这些卡式网络接口连接到与会者携带的笔记本电脑之类的信息终端设备，则无需麻烦与会者就能设置出席会议成员所使用的网络。同时，与作为设备在每个座位上配备诸如个人计算机之类的信息终端设备的情况不同，本发明能够避免增加会议室的设备成本。

卡式网络接口还包括：一个确定装置，用于基于将卡式网络接口连接到信息终端设备的事实，确定信息终端设备是作为 LAN 的主机还是客户机；以及一个处理装置，如果确定装置确定信息终端设备作为主机，则向客户机传送所请求的设置信息。如果确定装置确定信息终端设备作为客户机，则设置装置请求设置信息。

所以，LAN 的主机还包括连接卡式网络接口的信息终端设备。因此，无需配备专用设备作为与卡式网络接口和信息终端设备独立的主机，就能构建 LAN 系统。因此，在使用 LAN 的会议中，能够进一步抑制会议室中的设备成本。

基于将卡式网络接口连接到信息终端设备的事实，如果通过 LAN 并

未收到禁止将信息终端设备确定为主机的命令，则确定装置确定该信息终端设备为主机，同时通过 LAN 传送禁止将其他信息终端设备确定为主机的命令。因此，确定在该 LAN 区域内与卡式网络接口相连的第一信息终端设备为主机。

卡式网络接口还包括：一个处理装置，用于基于确定装置确定该信息终端设备为客户机，由设置装置完成网络设置以及由信息终端设备执行预定操作的事实，请求主机获得演示权限，并且基于主机获得演示权限的事实，向主机和其他客户机传送演示数据；以及一个处理装置，用于基于确定装置确定信息终端设备为主机，并且处理装置请求主机获得演示权限的事实，允许客户机获得演示权限。

所以，在使用 LAN 的会议中，例如，通过操纵手头的信息终端设备，与会者可以获得演示权限，并且能够传送演示数据。因此，与会者无需离开座位就能进行演示。

当连接装置将信息终端设备连接到无线 LAN 时，卡式网络接口还包括一个处理装置，用于在轮询系统中接收客户机的请求，其中基于确定装置确定信息终端设备为主机的事实，完成网络设置，并且设置装置在轮询周期结束时请求设置信息。

所以，主机能够准确接收完成网络设置的众多客户机通过无线 LAN 传送的请求。同时，主机能够通过无线 LAN 准确接收设置信息请求。

在卡式网络接口中存储演示应用程序软件（其内记录有用于显示和控制演示数据之处理过程的程序）。

因此，在使用 LAN 的会议中，例如，当与会者携带并未安装演示应用程序软件的信息终端设备时，如果将卡式网络接口连接到该信息终端设备，则信息终端设备能够执行上述演示应用程序软件，并且能够显示演示数据。

当信息终端设备为自动启动硬盘中存储的应用程序软件之类的设备时（如，其内安装有用于自动启动硬盘中存储的应用程序软件的操作系统的个人计算机），卡式网络接口允许信息终端设备将卡式网络接口识别为硬盘，从而能够在信息终端设备中自动启动演示应用程序软件。

所以，与会者无需执行启动演示应用程序软件的操作，并且能够进一步减轻强加给与会者的负担。

为了解决以上第二个问题，建议采用网络会议终端设备，其中将卡式网络接口连接到诸如个人计算机之类的信息终端设备，网络会议终端设备包括一个演示处理装置，用于显示和控制演示数据。卡式网络接口包括：一个连接装置，用于将信息终端设备连接到无线 LAN；以及一个设置装置，用于请求无线 LAN 的主机传送设置网络所需的设置信息，以便基于将卡式网络接口连接到信息终端设备的事实，将信息终端设备连接到无线 LAN，并且用于通过使用主机传送的设置信息设置网络。

通过将卡式网络接口用于以上卡式网络接口的无线 LAN，构建网络会议终端设备。因此，如果在会议室中配备卡式网络接口，并且由与会者携带信息终端设备，则无需麻烦与会者，就能设置出席使用无线 LAN 的会议的参与者所用的网络。同时，与作为设备在每个座位上配备信息终端设备的情况不同，本发明能够避免增加会议室的设备成本。

网络会议终端设备包括一个演示处理装置，用于显示和控制演示数据。网络会议终端设备能够利用演示处理装置显示演示数据。

另外，在网络会议终端设备中，卡式网络接口还包括：一个确定装置，用于基于将卡式网络接口连接到信息终端设备的事实，确定信息终端设备是作为 LAN 的主机还是客户机；以及一个处理装置，如果确定装置确定信息终端设备作为主机，则向客户机传送所请求的设置信息。如果确定装置确定信息终端设备作为客户机，则设置装置请求设置信息。

所以，LAN 的主机还包括网络会议终端设备。因此，无需配备专用设备作为与网络会议终端设备独立的主机，就能构建无线 LAN 会议系统。因此，能够进一步抑制会议室中的设备成本。

如上所述，确定装置确定在该无线 LAN 区域内与卡式网络接口相连的第一信息终端设备为主机。

网络会议终端设备还包括：一个处理装置，用于基于确定装置确定该信息终端设备为客户机，由设置装置完成网络设置以及由信息终端设备执行预定操作的事实，请求主机获得演示权限，并且基于主机获得演示

权限的事实，向主机和其他客户机传送演示数据；以及一个处理装置，用于基于确定装置确定信息终端设备为主机，并且处理装置请求主机获得演示权限的事实，允许客户机获得演示权限。

所以，在使用 LAN 的会议中，例如，通过操纵手头的信息终端设备，与会者可以获得演示权限，并且能够传送演示数据。因此，与会者无需离开座位就能进行演示。

另外，在网络会议终端设备中，卡式网络接口还包括一个处理装置，用于在轮询系统中接收客户机的请求，其中基于确定装置确定信息终端设备为主机的事实，完成网络设置，并且设置装置在轮询周期结束时请求设置信息。

所以，主机能够准确接收完成网络设置的众多客户机通过无线 LAN 传送的请求。同时，主机能够通过无线 LAN 准确接收设置信息请求。

在网络会议终端中，当信息终端设备执行网络接口卡中存储的演示应用程序软件时，能够实现演示处理装置。

所以，其中并未安装演示应用程序软件的信息终端设备能够显示演示数据。

当信息终端设备为自动启动硬盘中存储的应用程序软件之类的设备时，卡式网络接口允许信息终端设备将卡式网络接口识别为硬盘，从而能够在信息终端设备中自动启动演示应用程序软件。

所以，与会者无需执行启动演示应用程序软件的操作，并且能够进一步减轻强加给与会者的负担。

为了解决以上第二个问题，建议采用网络会议系统（无线 LAN 会议系统），其中提供一台无线 LAN 主机和一台无线 LAN 客户机，构建客户机以至将卡式网络接口连接到信息终端设备，信息终端设备包括一个演示处理装置，用于显示和控制演示数据。卡式网络接口包括：一个连接装置，用于将信息终端设备连接到无线 LAN；以及一个设置装置，用于请求无线 LAN 的主机传送设置网络所需的设置信息，以便基于将卡式网络接口连接到信息终端设备的事实，将信息终端设备连接到无线 LAN，并且用于通过使用主机传送的设置信息设置网络。主机基于设置信息请

求向客户机传送设置信息，并且向完成网络设置的客户机传送演示数据。

通过使用上述网络会议终端设备（如，上述无线 LAN 卡式网络接口）作为客户机，构建网络会议系统。

因此，无需麻烦与会者就能设置客户机网络，并且无需增加会议室的设备成本就能构建该系统。

另外，在该网络会议系统中，卡式网络接口还包括：一个确定装置，用于基于将卡式网络接口连接到信息终端设备的事实，确定信息终端设备是作为 LAN 的主机还是客户机；以及一个处理装置，如果确定装置确定信息终端设备作为主机，则向客户机传送所请求的设置信息。如果确定装置确定信息终端设备作为客户机，则设置装置请求设置信息。

从而，由于 LAN 的主机还包括相同的网络会议终端设备，所以无需在该系统内配备专用设备作为主机，因此，能够进一步抑制会议室中的设备成本。

如上所述，确定装置确定在该无线 LAN 区域内与卡式网络接口相连的第一信息终端设备为主机。

另外，在该网络会议系统中，卡式网络接口还包括：一个处理装置，用于基于确定装置确定该信息终端设备为客户机，由设置装置完成网络设置以及由信息终端设备执行预定操作的事实，请求主机获得演示权限，并且基于主机获得演示权限的事实，向主机和其他客户机传送演示数据；以及一个处理装置，用于基于确定装置确定信息终端设备为主机，并且处理装置请求主机获得演示权限的事实，允许客户机获得演示权限。

所以，通过操纵手头的网络会议终端设备，与会者可以获得演示权限，并且能够传送演示数据。因此，与会者无需离开座位就能进行演示。

另外，在该网络会议系统中，卡式网络接口还包括一个处理装置，用于在轮询系统中接收客户机的请求，其中基于确定装置确定信息终端设备为主机的事实，完成网络设置，并且设置装置在轮询周期结束时请求设置信息。

所以，主机能够准确接收完成网络设置的众多客户机通过无线 LAN 传送的请求。同时，主机能够通过无线 LAN 准确接收设置信息请求。

另外，在该网络会议系统中，当信息终端设备执行网络接口卡中存储的演示应用程序软件时，能够实现演示处理装置。

所以，使用其内并未安装演示应用程序软件的信息终端设备的主机和客户机，能够显示演示数据。

当信息终端设备为自动启动硬盘中存储的应用程序软件之类的设备时，卡式网络接口允许信息终端设备将卡式网络接口识别为硬盘，从而能够在信息终端设备中自动启动演示应用程序软件。

所以，与会者无需执行启动演示应用程序软件的操作，并且能够进一步减轻强加给与会者的负担。

为了解决以上第二个问题，建议采用网络会议系统，其中提供一台图像显示设备和一台无线 LAN 客户机。图像显示设备包括一台能够连接卡式网络接口的信息终端设备。将卡式网络接口连接到信息终端设备，信息终端设备包括一个演示处理装置，用于显示和控制演示数据。构建客户机以至将卡式网络接口连接到信息终端设备，并且包括演示处理装置。卡式网络接口包括：一个连接装置，用于将信息终端设备连接到无线 LAN；一个确定装置，用于基于将卡式网络接口连接到信息终端设备的事实，确定信息终端设备是作为无线 LAN 的主机还是客户机；一个设置装置，用于请求无线 LAN 的主机传送设置网络所需的设置信息，以便基于确定装置确定信息终端设备为客户机的事实，将信息终端设备连接到无线 LAN，并且用于通过使用主机传送的设置信息设置网络；一个处理装置，用于基于确定装置确定信息终端设备为主机的事实，向客户机传送所请求的设置信息，并且向完成网络设置的客户机传送演示数据；一个处理装置，用于基于确定装置确定该信息终端设备为客户机，由设置装置完成网络设置以及由信息终端设备执行预定操作的事实，请求主机获得演示权限，并且基于主机获得演示权限的事实，向主机和其他客户机传送演示数据；以及一个处理装置，用于基于确定装置确定信息终端设备为主机，并且请求主机获得演示权限的事实，允许客户机获得演示权限。图像显示设备是确定装置确定属于图像显示设备的信息终端设备为主机的设备。

网络会议系统的结构是将以上网络会议终端设备用作客户机（例如，使用以上无线 LAN 千兆网络接口），提供具有信息终端设备的图像显示设备座位图像显示设备，如投影仪，其中信息终端设备可以连接千兆网络接口，该图像显示设备同时作为图像显示设备和主机。

因此，无需麻烦与会者就能设置客户机网络，并且无需增加会议室的设备成本就能构建该系统。另外，与会者无需离开座位就能进行演示。

再者，通过无线 LAN，可以从图像显示设备向客户机直接传送与图像显示设备上显示的演示数据相同的演示数据，从而在客户机上显示。同时，通过无线 LAN，可以从客户机向图像显示设备直接传送演示数据，从而能够在图像显示设备上显示演示数据。

另外，在该网络会议系统中，千兆网络接口还包括一个处理装置，用于在轮询系统中接收客户机的请求，其中基于确定装置确定信息终端设备为主机的事实，完成网络设置，并且在轮询周期结束时等待设置信息的请求，其中设置装置在轮询周期结束时请求设置信息。

所以，主机能够准确接收完成网络设置的众多客户机通过无线 LAN 传送的请求，同时，主机能够通过无线 LAN 准确接收设置信息请求。

另外，在该网络会议系统中，当信息终端设备执行网络接口千中存储的演示应用程序软件时，能够实现演示处理装置。

所以，使用其内并未安装演示应用程序软件的信息终端设备的主机和客户机，能够显示演示数据。

当信息终端设备为自动启动硬盘中存储的应用程序软件之类的设备时，千兆网络接口允许信息终端设备将千兆网络接口识别为硬盘，从而能够在信息终端设备中自动启动演示应用程序软件。

所以，与会者无需执行启动演示应用程序软件的操作，并且能够进一步减轻加给与会者的负担。

附图的简要描述

图 1 是一个功能框图，表示具有常规网络接口千的个人计算机部分，该部分用于执行网络设置。

图 2 表示执行图 1 所示的个人计算机网络设置所需的工作程序。

图 3 是一个透视图，表示应用本发明的网络接口卡的外观示例。

图 4 是一个框图，表示图 3 所示的网络接口卡的电路结构示例。

图 5 表示根据本发明的网络会议系统的总体结构示例。

图 6 是一个流程图，参照该图说明“主机/客户机判定程序”的处理内容。

图 7 是一个流程图，参照该图说明与“客户机程序”的网络设置处理相对应的“主机程序”的处理内容。

图 8 是一个流程图，参照该图说明作为“客户机程序”的一部分处理内容的网络设置处理。

图 9 是一个定时图，表示按照轮询系统传送或接收请求信号的方式。

图 10A 表示图 9 所示的轮询命令和请求信号的格式。

图 10B 表示数据或命令的内容示例。

图 11 是一个功能框图，表示图 5 所示的用于执行网络设置的客户机部分。

图 12 表示用于执行图 5 所示的客户机的网络设置的工作过程。

图 13 是一个流程图，参照该图说明“主机程序”的处理内容部分。

图 14 是一个流程图，参照该图说明“客户机程序”的处理内容部分。

图 15 是一个流程图，参照该图说明“主机程序”的处理内容部分。

图 16 是一个流程图，参照该图说明“客户机程序”的处理内容部分。

图 17 表示根据部分们的网络会议系统的总体结构的其他示例。

图 18 表示根据部分们的网络会议系统的总体结构的不同示例。

图 19 表示根据部分们的网络会议系统的总体结构的其他不同示例。

本发明的最佳实施模式

以下参照附图说明根据本发明的实施方式。

图 3 表示应用本发明的网络接口卡的外观和结构示例，以及能够连接该网络接口卡的笔记本电脑。网络接口卡 1 具有基于 PCMCIA 标准类型 2 或类型 3 的形状和尺寸。笔记本电脑 2 包括一个个人计算机插卡插槽 2a，可以将网络接口卡 1 插入到插槽 2a 中。

图 4 表示网络接口卡 1 的电路结构示例。网络接口卡 1 包括一个

PCMCIA 接口 3，一个网络接口 4，一个 RF 调制器 5，一个 RF 解调器 6，一个天线 7，一个 CPU 8，一个快闪 ROM 9 和一个 RAM 10。

PCMCIA 接口 3 是一个接口部分，该部分与具有 PC 卡插槽的个人计算机（如图 3 所示的笔记本电脑 2）相互作用。通过 PCMCIA 接口 3，在具有网络接口卡 1 的个人计算机和网络接口卡 1 之间传送和接收数据和命令。

网络接口 4 将个人计算机通过 PCMCIA 接口 3 传送的数据和命令，转换为符合预定无线 LAN 标准（如，IEEE 802 之 802 中 11 工作组的标准）之格式的数据和命令，将经过转换的数据和命令传送到 RF 调制器 5，反向转换 RF 解调器 6 传送的数据和命令，将经过反向转换的数据和命令传送到 PCMCIA 接口 3。

RF 调制器 5 将网络接口 4 传送的数据和命令，调制为基于标准的射频信号，然后从天线 7 传送射频信号。RF 解调器 6 解调在天线 7 接收的射频信号，以提供数据和命令，然后将该数据和命令传送到网络接口 4。尽管图 3 表示天线 7 为内部天线的外观结构，但是本发明并不限于此，可以使用其形状暴露在外的天线响应频带等。

CPU 8 通过执行快闪 ROM 9 中存储的微程序（固件）控制 PCMCIA 接口 3，从而能够在网络接口卡和具有网络接口卡 1 的个人计算机之间传送、接收数据和命令，同时，CPU 8 控制网络接口 4，从而能够根据预定通信协议（如，TCP/IP 协议），通过无线 LAN 传送、接收数据和命令。

作为本发明的特征，快闪 ROM 9 存储以下微程序（1）到（4）。在稍后说明的网络会议系统的主机和客户机的操作示例中，说明程序（1）到（3）处理的内容。

（1）：能够使具有网络接口卡 1 的个人计算机作为管理无线 LAN 的主机的程序（以下称为“主机程序”）。

（2）：能够使具有网络接口卡 1 的个人计算机作为使用主机管理的无线 LAN 的客户机的程序（以下称为“客户机程序”）。

（3）：用于确定应执行主机程序还是执行客户机程序的程序（以下称为“主机/客户机判定程序”）。

（4）：演示应用程序软件（用于显示、控制诸如图像和图形之类演示数据的程序）。应用程序软件包含图形查看程序，后者为用于显示图像的软件，用于创建、显示、控制图形的软件（如，由 Microsoft 制造的“Microsoft PowerPoint”，“ Microsoft”和“PowerPoint”为 Microsoft 的注册商标），以及 WWW 浏览器，WWW 浏览器为用于访问因特网上的 WWW 服务器以显示网页图像的软件。

RAM 10 存储 CPU 8 执行快闪 ROM 9 中的微程序时的各种数据。

接着，图 5 表示根据本发明的网络会议终端设备（无线 LAN 会议终端设备）的结构示例，以及根据本发明的网络会议系统（无线 LAN 会议系统）的总体结构示例。

各个无线 LAN 会议系统包括许多（如，约 30 台到 50 台）无线 LAN 会议终端设备 11（11(1)到 11(n)），一台投影仪 12 和一部视频摄象机 13.

无线 LAN 会议终端设备 11 的构造方式为：将图 3 和图 4 所示的网络接口卡 1 连接到图 3 所示的笔记本电脑 2 之类的笔记本电脑（例如，安装 Windows 95 或 Windows 98 操作系统）。参加者携带笔记本电脑，而在会议室中配备网络接口卡 1.

无线 LAN 会议终端设备 11 的一个设备（11(1)）作为无线 LAN 的主机，剩余（n-1）终端设备（11(2)到 11(n)）作为无线 LAN 的客户机。

基于将网络接口卡 1 连接到笔记本电脑后启动笔记本电脑的操作系统的事实（或基于将网络接口卡 1 连接到已启动其操作系统的笔记本电脑的事实），当网络接口卡 1 启动上述快闪 ROM 9 中存储的“主机/客户机判定程序”时，确定无线 LAN 会议终端设备 11。

图 6 表示“主机/客户机判定程序”的处理内容。首先，初始化网络接口卡 1（删除连接该网络接口卡时存储的数据以及笔记本电脑使用的数据）（步骤 S1）。接着，确定是否通过无线 LAN 收到禁止启动“主机程序”的命令。（步骤 S2）。

如果未收到该命令，则启动“主机程序”（步骤 S3）。接着，通过无线 LAN 连续不断地传送禁止启动“主机程序”的命令，直至从笔记本电脑中拔出网络接口卡 1 或关闭笔记本电脑的操作系统（步骤 S4、S5）。

于是，当从笔记本电脑中拔出网络接口卡 1 或关闭操作系统时，结束控制。

另一方面，如果在步骤 S2 中收到上述命令，则启动“客户机程序”（步骤 S6），然后结束控制。

因此，在通过执行步骤 S2 到 S4 启动“主机程序”后，无线 LAN 会议终端设备 11 中连接网络接口卡 1 并在会议室内（在无线 LAN 区域内）启动笔记本电脑之操作系统的第一台终端设备作为主机。

在通过执行步骤 S1、S2 和 S5 启动“客户机程序”后，由于无线 LAN 会议终端设备 11 中连接网络接口卡 1 并启动笔记本电脑之操作系统的第二台终端设备，接收到连接网络接口卡 1 并启动笔记本电脑之操作系统的第一台无线 LAN 会议终端设备 11 传送的命令，所以该终端设备作为客户机。

实际上，充当会议主持人的参与者首先将网络接口卡 1 连接到笔记本电脑，或者该参与者首先启动笔记本电脑之操作系统，以使其自己的无线 LAN 会议终端设备 11 成为主机。

正如图 5 所示，通过笔记本电脑的外部显示输出终端，将主机 11(1)连接到会议室中的投影仪 12，并且通过笔记本电脑的 DV 终端，将其连接到视频摄象机 13。

通过笔记本电脑的网络端口，将主机 11(1)连接到无线 LAN（如，以太网），其中预先在会议室中的建筑内构建无线 LAN。通过网关（未示出）将无线 LAN 连接到因特网。

“客户机程序”包含用于执行网络设置以便将客户机 11(2)到 11(n)连接到无线 LAN 的处理。立即启动其“客户机程序”的客户机 11(2)到 11(n)的网络接口卡 1 启动以上网络设置处理。

“主机程序”包含响应以上“客户机程序”的网络设置处理，传送客户机 11(2)到 11(n)的网络设置所需的设置信息的处理。主机 11(1)立即启动“主机程序”的处理。

图 7 表示与网络设置处理相对应的“主机程序”的处理内容。图 8 表示网络设置处理的内容。正如图 7 所示，主机 11(1)的网络接口卡 1 显

示通知笔记本电脑用户输入以下信息（a）到（d）的画面:

（a）: 输入网络掩码（用于将 IP 地址划分为预先确定的网络部分和可以自由设置的主机部分的信息）;

（b）: 输入主机的 IP 地址;

（c）: 输入 DNS 服务器（用于提供 IP 地址和域名之间的转换的服务器）的 IP 地址; 以及

（d）: 输入网关（位于图 3 所示的无线 LAN 和因特网之间的连接部分的装置）的 IP 地址。

随后，当会议主持人根据屏幕上显示的说明，通过操作笔记本电脑输入上述信息时，将以上信息记录到 RAM 10 中作为数据库（步骤 S12）。其后，主机进入待机模式，等待客户机的网络设置请求（步骤 S13）。

“主机程序”包含用于在轮询系统中接收已完成网络设置的客户机（已记录其 IP 地址作为数据库的客户机）的网络接口卡 1 的各种请求，以便顺序呼叫所有客户机的处理。另外，“客户机程序”包含用于响应以上呼叫，传送完成网络设置后生成的请求的处理。

图 9 表示根据以上轮询系统传送、接收请求的方式。主机 11(1)的网络接口卡 1 传送一个轮询命令，以允许将该请求传送到已完成网络设置的客户机 11(2)到 11(i)中的一个客户机 11(2)。然后，该网络接口卡在固定时间 t 内等待该请求。

客户机 11(2)的网络接口卡 1 获知允许它传送该请求，并且在时间 t1 内传送该请求，如果有任何请求的话。另一方面，不允许客户机 11(3)到 11(i)的网络接口卡 1 传送请求，因此它们不传送请求。所以，在时间 t1 内，主机 11(1)只收到客户机 11(2)的请求。

其后，主机 11(1)的网络接口卡 1 传送一个轮询命令，以允许将该请求传送到下一客户机 11(3)，并在时间 t1 内等待请求。在时间 t1 内，主机只收到客户机 11(3)的请求。

同样，主机顺序向客户机 11(4)到 11(i)依次传送轮询命令，并在时间 t1 内等待其请求。因而，由于依次从客户机 11(2)到 11(i)传送请求，并由主机 11(1)接收，所以该主机能够准确接收所有客户机的请求，而不会受

同时通过无线 LAN 接收众多客户机的请求时造成的干扰的影响。

将表示已完成网络设置的客户机的一个呼叫周期结束的数据“轮询结束”（表示轮询周期结束），添加到要传送到最后一台客户机 11(i)的轮询命令中。接着，在主机在时间 t1 内等待客户机 11(i)的请求后，该主机在固定时间 t2 内再次进入待机模式。如果在时间 t2 内，主机未收到请求，则主机立即呼叫下一客户机（即，主机再次顺序向客户机 11(2)到 11(i)依次传送轮询命令，并在时间 t1 内等待请求）。

图 10A 表示轮询命令和请求信号的格式。轮询命令和请求信号依次包含传送目的地的 IP 地址，传送源的 IP 地址，一个表示后继信号的字节数的值，表示轮询命令和请求信号的内容的数据或命令，以及一个校验和。

图 10B 表示图 10A 所示数据或命令的内容示例。“轮询结束”是为了表示轮询结束而添加到传送给最后一台客户机的轮询命令中的数据。

在以上轮询周期内，与笔记本电脑连接的客户机 11(i+1)的网络接口卡 1（未执行网络设置），继续监视以上轮询命令，直至收到附加了数据“轮询结束”的轮询命令（即，直至轮询周期结束）如图 8 所示（步骤 S21、S22）。接着，在轮询周期结束时，在经过允许图 9 所示的客户机 11(i)传送请求信号的时间 t1 后，在时间 t2 内向主机 11(1)传送网络设置请求信号（当在时间 t1 内收到客户机 11(i)传送的请求信号时，可以在时间 t1 过去前，向主机传送请求信号）（步骤 S23）。

根据图 10A 所示的信号格式，传送网络设置请求信号。然而，由于没有从主机 11(1)给出客户机 11(i+1)的 IP 地址，所以将传送源的 IP 地址设置为一个哑地址，例如，由客户机 11(i+1)的网络接口卡 1 确定哑地址。正如图 10B 所示，在该网络设置请求信号中，将数据或命令的内容设置为“请求 IP 地址”。

在图 7 所示的步骤 S13 中，在图 9 中的轮询周期结束后的每个时刻 t2，主机 11(1)的网络接口卡 1 等待该网络设置请求信号。所以，客户机能够准确接收网络设置请求，而不会受同时接收已经完成网络设置的客户机的请求和该网络设置请求时造成的干扰的影响。

接着，如果该主机在时间 t2 内收到网络设置请求，则暂停接收图 9 所示处理的轮询系统（步骤 S14）。然后，给出客户机 11(i+1)的 IP 地址，并且如图 9 所示，向客户机 11(i+1)传送该 IP 地址以及在步骤 S12 记录的主机 IP 地址和 DNS 服务器的 IP 地址，作为网络的设置信息（步骤 S15）。

根据图 10A 所示的信号格式传送上述 IP 地址。将传送目的地的 IP 地址设置为哑地址，由上述客户机 11(i+1)的网络接口卡 1 确定哑地址。

正如图 8 所示，传送网络设置请求信号的客户机 11(i+1)等待接收以上 IP 地址（步骤 S24）。接着，如果收到上述 IP 地址，则通过将上述 IP 地址存储到 RAM 10 中，执行用于将客户机 11(i+1)连接到无线 LAN 的设置（步骤 S25）。然后，通过无线 LAN 传送表示完成网络设置的数据（步骤 S26）。然后，结束控制。

根据图 10A 所示的信号格式，传送表示完成网络设置的数据。接着，将传送源的 IP 地址设置为主机 11(1)给出的 IP 地址。正如图 10B 所示，在该数据中，将该数据或命令的内容设置为“完成设置 IP 地址”。

如图 7 所示，主机 11(1)的网络接口卡 1 等待接收表示完成网络设置的数据（步骤 S16）。接着，当收到该数据时，记录给予客户机 11(i+1)的 IP 地址作为数据库（步骤 17）。

其后，重新开始临时中断的轮询系统请求接收处理过程（步骤 S18）。在重新启动的轮询系统请求接收处理中，顺序呼叫客户机 11(2)到客户机 11(i+1)，包括完成网络设置的客户机 11(i+1)。

接着，回到步骤 S13，主机等待其他客户机执行网络设置。执行图 7 所示的处理，直至从笔记本电脑中拔出网络接口卡 1 或关闭笔记本电脑的操作系统。

在恢复的轮询系统请求接收处理中，顺序呼叫客户机 11(2)到客户机 11(i+1)，包括完成网络设置的新的客户机。

在仍未完成某一台客户机的网络设置的阶段中，根据该轮询系统，主机 11(1)的网络接口卡 1 不接收请求信号。因此，在该阶段中，例如，当主机 11(1)的网络接口卡 1 在图 7 所示的步骤 S13 中连续不断地等待该客户机的网络设置请求时，如果主机 11(1)仍未传送轮询命令，则该客户机

的网络接口卡 1 随时传送网络设置请求。

假设参与者要加入无线 LAN，则通过图 7 和图 8 所示的处理，完成将图 5 所示的各客户机 11(2)到 11(n)连接到无线 LAN 的网络设置。

图 11 表示用于执行以上网络设置的客户机 11(2)到 11(n)的任意部分的功能。用于控制网络接口卡 1 的设备驱动程序（图 4 所示的快闪 ROM 9 内存储的微程序），包括网络设置功能（“主机程序”和“客户机程序”）。通过使用网络接口卡 1 的设备驱动程序功能，执行客户机 11(2)到 11(n)的网络设置。

因此，与表示常规网络接口卡的图 1 形成鲜明对比，无需使用连接网络接口卡 1 的笔记本电脑的操作系统，就能执行网络设置。

图 12 表示为执行客户机 11(2)到 11(n)的网络设置而由与会者执行的操作过程。当将网络接口卡 1 连接到笔记本电脑并启动笔记本电脑的操作系统时（也可以在启动笔记本电脑的操作系统后，将网络接口卡 1 连接到笔记本电脑），由图 7 和图 8 所示的处理过程自动执行网络设置。

因此，与表示常规网络接口卡的图 2 形成鲜明对比，假设参与者要加入无线 LAN，则无需向与会者强加负担，就能完成客户机 11(2)到 11(n)的网络设置。

“主机程序”和“客户机程序”分别包含通过使用快闪 ROM 9 中存储的演示应用程序软件进行演示的处理过程。在完成任意一台客户机的网络设置后，已经启动“主机程序”的主机 11(1)的网络接口卡 1，立即开始该处理过程。在完成各网络设置后，已经启动“客户机程序”的客户机 11(2)到 11(n)的网络接口卡 1 也开始该处理过程。

图 13 和 14 分别表示“主机程序”和“客户机程序”的处理内容。正如图 13 所示，主机 11(1)的网络接口卡 1 使得主机 11(1)的笔记本电脑的操作系统将网络接口卡 1 识别为硬盘。同时，该网络接口卡安装一个自动启动文档（步骤 S31）。

Windows 95 和 Windows 98 具有以下功能，即，当将自动启动文档安装到硬盘上时，可以自动启动硬盘上存储的应用程序软件。因此，基于步骤 S31 的处理，主机 11(1)的笔记本电脑将网络接口卡 1 识别为硬盘，

从而自动启动快闪 ROM 9 中存储的演示应用程序软件。

例如，步骤 S31 的处理可以为采用“存储条”的现有处理。

通过根据自动启动的演示应用程序软件，操纵主机 11(1)的笔记本电脑，会议主持人可以在主机 11(1)的笔记本电脑上显示演示数据，并且通过主机 11(1)的笔记本电脑的外部显示输出终端，在投影仪（图 5）上显示相同的演示数据。

具体而言，例如，通过使用“Microsoft PowerPoint”，可以在主机 11(1)的笔记本电脑和投影仪 12 上，显示从主机 11(1)的笔记本电脑的硬盘和软盘上重显的图表等内容，以及从无线 LAN 的服务器传送的图表等内容。

通过使用图形查看程序，可以在主机 11(1)的笔记本电脑和图 5 所示的投影仪 12 上，显示通过使用图像查看程序从主机 11(1)的笔记本电脑的硬盘和软盘上重显的图像，从无线 LAN 的服务器传送的图像，以及视频摄象机 13（图 5）拾取的图像。

另外，通过利用 WWW 浏览器经由无线 LAN 访问因特网的 WWW 服务器，可以在主机 11(1)的笔记本电脑和图 5 所示的投影仪 12 上，显示网页的图像等。

正如图 14 所示，客户机 11(2)到 11(n)的网络接口卡 1，使得客户机 11(2)到 11(n)的笔记本电脑分别将网络接口卡 1 识别为硬盘。同时，上述网络接口卡安装自动启动文档（步骤 41）。

因此，客户机 11(2)到 11(n)的笔记本电脑将网络接口卡 1 识别为硬盘，从而可以自动启动快闪 ROM 9 中存储的演示应用程序软件。

通过分别利用演示应用程序软件操纵客户机 11(2)到 11(n)的笔记本电脑，除主持人之外的其他与会者，能够在客户机 11(2)到 11(n)的笔记本电脑上显示演示数据。

正如图 13 所示，主机 11(1)的网络接口卡 1，等待利用演示应用程序软件在主机 11(1)的笔记本电脑上显示演示数据的操作（步骤 S32）。

接着，在执行该操作时（即，在主机 11(1)的笔记本电脑和投影仪 12 上显示演示数据时），将相同的演示数据传送到客户机 11(2)到 11(n)，

并且向客户机 11(2)到 11(n)传送使用与该演示数据相对应的演示应用程序软件（例如，在图像情况中使用图像查看程序）显示数据的命令，以及以与主机 11(1)同步的方式（使换页定时等一致）显示演示数据的命令。

正如图 14 所示，客户机 11(2)到 11(n)的网络接口卡 1 等待接收该演示数据和命令（步骤 S42）。接着，如果网络接口卡收到演示数据和命令，则分别根据该命令利用演示应用程序软件在客户机 11(2)到 11(n)的笔记本电脑上显示该演示数据（步骤 S43）。

因此，在客户机 11(2)到 11(n)的笔记本电脑上，显示与投影仪 12 上显示的演示数据相同的演示数据。

如图 13 所示，在执行步骤 S32 和 S33 时，主机 11(1)的网络接口卡 1 重复确定是否收到任一客户机 11(2)到 11(n)的演示权限获得请求（步骤 S34）。在图 13 和 14 所示的处理中，在图 9 所示的轮询系统中，传送、接收该请求信号。

如图 14 所示，在执行步骤 S42 和 S43 时，客户机 11(2)到 11(n)的网络接口卡 1，重复确定客户机 11(2)到 11(n)的笔记本电脑是否执行了获得演示权限的预定操作（步骤 S44）。如果执行了该操作，则向主机 11(1)传送演示权限获得请求（步骤 S45）。

如图 13 所示，如果收到任一客户机 11(2)到 11(n)的演示权限获得请求，则主机 11(1)的网络接口卡 1 向相应客户机传送演示权限获得命令（步骤 S35）。

如图 14 所示，在传送演示权限获得请求的客户机的网络接口卡 1 传送演示权限获得请求后，该网络接口卡 1 等待接收演示权限获得命令（步骤 S46）。

在收到该命令时，该网络接口卡等待有关客户机的笔记本电脑利用演示应用程序软件显示演示数据（步骤 S47）。

如果执行上述操作（即，如果在有关客户机的笔记本电脑上显示演示数据），则向主机 11(1)和其他客户机传送相同的演示数据，并且向主机 11(1)和其他客户机传送使用与演示数据相对应的演示应用程序软件显示演示数据的命令，以及以与有关客户机同步的方式显示演示数据的命令

（步骤 S48）。

如图 13 所示，由主机 11(1)的网络接口卡 1 确定是否收到该演示数据和命令（步骤 S36）。如果收到演示数据和命令，则利用演示应用程序软件在主机 11(1)的笔记本电脑和投影仪 12 上显示该演示数据（步骤 S37）。在图 14 所示的步骤 S42、S43 中，其他客户机的网络接口卡 1 显示该演示数据。

因此，在主机 11(1)和其他客户机的笔记本电脑以及投影仪 12 上，显示与获得演示权限的客户机的笔记本电脑上显示的演示数据相同的演示数据。

如图 13 所示，在执行步骤 S36 和 S37 时，主机 11(1)的网络接口卡 1 重复确定主机 11(1)的笔记本电脑是否执行了用于返回演示权限的预定操作，并且重复确定是否收到其他客户机的新的演示权限获得请求（步骤 S39）。

随后，如果执行了演示返回操作，则向获得演示权限的客户机传送返回演示权限的命令（步骤 S40）。然后，控制返回到步骤 S32。

如果收到任一其他客户机的演示权限获得请求，则在步骤 S35 中，向该客户机传送新的演示权限获得命令。

如图 14 所示，在执行步骤 S47 和 S48 并传送演示数据和命令时，由获得演示权限的客户机的网络接口卡 1，重复确定是否收到演示权限返回命令或用于使其他客户机获得演示权限的命令（步骤 S49）。接着，如果收到命令，则控制返回到步骤 S42。

因此，再次将演示权限转移到主机 11(1)或其他客户机，并且在主机 11(1)和客户机 11(2)到 11(n)的笔记本电脑以及投影仪 12 上，显示从主机 11(1)或该客户机传送的演示数据。

连续不断地执行图 13 和 14 所示的处理，直至从笔记本电脑中拔出网络接口卡 1 或结束笔记本电脑的操作系统。

通过图 13 和 14 所示的处理，在客户机 11(2)到 11(n)的笔记本电脑上，显示与投影仪 12 上显示的演示数据相同的演示数据。另外，其他客户机的笔记本电脑和投影仪 12 上显示从该客户机（获得演示权限的客户机）

传送的演示数据。

因此，通过观看手头客户机的笔记本电脑的屏幕，其座位远离投影仪的参与者能够在视觉上很好地确认演示数据。而其座位靠近投影仪 12 的参与者，能够从投影仪 12 或从其客户机的笔记本电脑上观看演示数据（如，通过具有较大屏幕的投影仪 12 观看图像，并且通过手头客户机的笔记本电脑观看较小的插图）。

另外，当坐下时，与会者能够利用手边的客户机获得演示权限，并且能够传送演示数据。因此，参与者无需离开座位就能进行演示。

“主机程序”和“客户机程序”包含用于在各客户机 11(2)到 11(n)的笔记本电脑上，分别显示来自无线 LAN 的服务器上的数据以及来自因特网的 WWW 服务器上的数据的处理程序。在图 13 和 14 所示的演示处理中自动启动演示应用程序软件后，主机 11(1)和客户机 11(2)到 11(n)的网络接口卡 1 立即启动上述处理。

图 15 和 16 分别表示有关“主机程序”和“客户机程序”的处理内容。如图 15 所示，由主机 11(1)的网络接口卡 1，确定是否收到各客户机 11(2)到 11(n)对无线 LAN 的服务器和因特网的 WWW 服务器的访问请求（步骤 S51）。在图 15 和 16 所示的处理中，根据图 7 所示的轮询系统，传送、接收该请求。

如图 16 所示，由客户机 11(2)到 11(n)的网络接口卡 1，确定有关客户机 11(2)到 11(n)的笔记本电脑是否访问无线 LAN 的服务器或因特网的 WWW 服务器（步骤 S61）。如果执行此操作，则向主机 11(1)传送对此服务器的访问请求（步骤 S62）。

如图 15 所示，如果收到客户机的访问请求，则主机 11(1)的网络接口卡 1 根据此访问请求访问服务器（无线 LAN 的服务器或因特网的 WWW 服务器），并客户机传送从该服务器传送的数据（步骤 S52）。

因此，在该客户机的笔记本电脑上，分别显示无线 LAN 的服务器上的数据或因特网的 WWW 服务器上的数据。

如果正由图 13 和 4 所示的处理执行演示，则在步骤 S52 中向该客户机传送此服务器上的数据，而不是迄今为止传送的演示数据。因此，在

该客户机的笔记本电脑上，显示该服务器上的数据（即，与主机 11(1)和其他客户机的笔记本电脑显示的演示数据不同的数据），而不是迄今为止显示的演示数据。

在执行步骤 S52 时，由主机 11(1)的网络接口卡 1 重复确定是否收到来自客户机的访问结束请求（步骤 S53），是否收到新的访问请求（步骤 S54），以及是否正在执行演示，是否显示的新的演示数据已改变（换页等）（步骤 S55）。

如图 16 所示，在传送访问请求后，由客户机 11(2)到 11(n)的网络接口卡 1 重复确定有关客户机 11(2)到 11(n)的笔记本机电脑是否结束访问（步骤 S63），以及它们是否访问新的服务器（步骤 S64）。

接着，如果确定执行了访问结束操作，则向主机 11(1)传送访问结束请求（步骤 S65），然后控制返回到步骤 S61。如果确定执行访问不同服务器的操作，则控制返回到步骤 S62。

如图 15 所示，如果收到访问结束请求，则主机 11(1)的网络接口卡 1 结束对该服务器的访问（步骤 S56），然后控制返回到步骤 S51。因此，在执行演示时，在该客户机的笔记本电脑上再次显示该演示数据。

如果收到新的访问请求，则根据该访问请求，此时在步骤 S52 中访问该服务器，并向客户机传送数据。

如果此刻正在执行演示并且显示的新的演示数据已改变，则在常数时间内中断传送该服务器上的数据（步骤 S57）。

当在步骤 S57 中中断传送该服务器上的数据时，利用图 13 和 14 所示的处理向客户机传送演示数据。因此，每当显示的演示数据改变时，均在客户机的笔记本电脑上显示已改变的演示数据，其中在常数时间内，显示无线 LAN 的服务器上的数据以及因特网的 WWW 服务器上的数据。

连续不断地执行图 15 和 16 所示的处理，直至从笔记本电脑中拔出网络接口卡 1 或结束笔记本电脑的操作系统。

因为图 15 和 16 所示的处理，当与会者希望在演示前检查无线 LAN 的服务器上的数据和因特网的 WWW 服务器上的数据时，可以利用手头的客户机检查服务器上的数据。

当该参与者在其他参与者进行演示时检查数据时，由于每当显示的演示数据改变时均在常数时间内显示已改变的演示数据，所以能够防止由于错误而忽略演示数据。

如上所述，在该无线 LAN 会议系统中，由于在会议室中配备卡式网络接口卡 1，并且由与会者携带笔记本电脑和卡式网络接口卡 1 组成各客户机，因此无需向与会者强加负担就能构建客户机网络，并且与作为设备在每个座位上安装个人计算机的情况不同，能够在不增加会议室的设备成本的情况下构建该系统。

另外，由于主机由与客户机相同的网络会议终端设备组成，所以无需提供专用设备作为主机，因此能够进一步降低会议室的设备成本。

另外，由于在网络接口卡 1 上存储演示应用程序软件，所以即使与会者携带未安装该演示应用程序软件的笔记本电脑，此类笔记本电脑也能显示演示数据。

再者，能够自动启动以上演示应用程序软件。因此，与会者无需执行启动该演示应用程序软件的操作，从而能够进一步减轻强加给参与者的负担。

由于利用无线 LAN 连接主机和客户机，所以无需在会议室中铺设同轴电缆和光纤之类的有线传输介质，从该观点看，能够降低设备成本。另外，与铺设有线传输介质的情况不同，会议室内的无线 LAN 会议终端设备的位置是不固定的（因此，座位的布局是不固定的），因此可以自由确定座位布局。

此外，无需改变其内配备有会议室的建筑内预先构建的有线 LAN，就能构建 LAN 会议系统。

在上例中，“主机/客户机判定程序”的处理内容在于：连接网络接口卡 1 并且在会议室内启动笔记本电脑的操作系统的第一台无线 LAN 会议终端设备 11 作为主机。

然而，“主机/客户机判定程序”的处理内容并不限于此，并且处理内容可以为，利用适当方法确定任意一台无线 LAN 会议终端设备 11 作为主机（如，在笔记本电脑上显示供参与者选择主机或客户机的图片，

然后根据笔记本电脑的操作确定主机或客户机）。

尽管在上例中提供投影仪，但是作为另一个示例，通过仅仅在主机或客户机的笔记本电脑上显示演示数据，无需提供投影仪，也能构建无线 LAN 会议系统。

由于通过上例中的笔记本电脑的外部显示终端，将投影仪仅仅连接到主机，所以当除会议主持人之外的其他参与者进行演示时，该主机将从客户机传送到该主机的演示数据，传送到投影仪。

然而，作为另一个示例，如图 17 所示，通过使用可与无线 LAN 连接的投影仪（如，与个人计算机相连的投影仪，其中可以将个人计算机连接到无线 LAN）14，从客户机 11(2)到 11(n)，通过无线 LAN，可以直接将演示数据传送到投影仪 14（通过无线 LAN，主机 11(1)也可以将演示数据传送到投影仪 14）（在图 17 中，利用相同的参考号数表示与图 5 所示部分相同的部分，并且该关系同样适用于图 18 和 19）。

在上例中，作为独立部分提供主机和投影仪。然而，作为另一个示例，如图 18 所示，可以提供带有个人计算机 15 的投影仪 16，其中个人计算机 15 具有 PC 卡插槽。将网络接口卡 1 插入到个人计算机 15 中，并且将此台个人计算机作为主机，从而也可以将投影仪作为主机。

在图 18 所示的无线 LAN 会议系统中，通过无线 LAN，直接将投影仪 16 显示的相同演示数据，从投影仪 16 传送到到客户机 11(2)到 11(n)，从而在客户机 11(2)到 11(n)上进行显示。与图 17 所示的无线 LAN 会议系统相似，通过无线 LAN，可以直接将演示数据从客户机 11(2)到 11(n)传送到投影仪 16，从而在投影仪 16 上显示该演示数据。

另外，在图 18 所示的示例中，当可以从所有座位上清楚观看投影仪 16 上显示的数据并且只有一个参与者进行演示时，如图 19 所示，例如，仅仅提供一台无线 LAN 会议终端设备（客户机）11(2)。因此，可以连接无线 LAN 会议终端设备 11 与有线 LAN 和视频摄象机 13，从而将进行演示的参与者自始至终利用客户机 11(2)获得演示权限，并且可以将演示数据传送到投影仪 16.

在示例中，在网络接口卡中不仅存储“客户机程序”，而且存储“主

机/客户机判定程序”和“主机程序”，从而可以将连接有网络接口卡的笔记本电脑作为主机。

然而，作为另一个示例，也可以不在网络接口卡中存储“主机/客户机判定程序”和“主机程序”，并且基于将网络接口卡插入到笔记本电脑中的事实，继续启动“客户机程序”。 如果是那样的话，作为主机，可以使用安装有“主机程序”和演示应用程序软件并且连接普通（与本发明无关）网络接口卡的个人计算机（在图 18 和 19 所示的示例中，可以在与投影仪相连的个人计算机上安装“主机程序”和演示应用程序软件，并且将普通网络接口卡连接到该个人计算机）。

在上例中，“主机程序”和“客户机程序”包含客户机获得演示权限的处理。然而，当与会者无需利用手头的客户机传送演示数据时（如，特定人物进行单方面演示的广播会议），“主机程序”和“客户机程序”无需包含此类处理。

在上例中，在网络接口卡中存储演示应用程序软件。然而，作为不同示例，也可以不在网络接口卡中存储演示应用程序软件，而是将网络接口卡连接到安装有演示应用程序软件的笔记本电脑中。

在上例中，将网络接口卡连接到笔记本电脑，从而导致正在构建的客户机和主机。然而，本发明并不限于此，通过将网络接口卡连接到能够连接 PC 卡的任何合适信息终端设备（除笔记本电脑之外的其他个人计算机，作为高度复杂的电子记事本的个人数字助理，打印机，具有内置摄象机的图像记录设备等），也可以构建客户机和主机。

在上例中，网络接口卡采用射频系统作为无线 LAN 系统。然而，作为不同示例，也可以采用红外系统作为无线 LAN 系统。

在上例中，将网络接口卡应用于无线 LAN 会议系统。然而，本发明并不限于此，也可以将网络接口卡应用于除无线 LAN 会议系统之外的其他用途。然而，如果是那样的话，网络接口卡可以通过有线 LAN 传送、接收数据。

在上例中，将本发明应用于基于 PCMCIA 标准的网络接口卡。然而，本发明并不限于此，可以将本发明应用于能够连接到信息终端设备的任

何合适的卡式（包括超薄芯片类型的）网络接口卡。

本发明并不限于以上示例，更不用说本发明可以采取各种结构而并不背离其实质。

如上所述，根据本发明的卡式网络接口卡，达到在不向用户强加负担的情况下，执行用于连接诸如个人计算机之类的信息终端设备的网络设置的目的。

因此，在使用 LAN 的会议中，例如，如果在会议室中配备以上卡式网络接口卡，并且将以上卡式网络接口卡连接到诸如与会者携带的笔记本电脑之类信息终端设备中，则能够在不向出席会议的参与者强加负担的情况下执行网络设置。另外，与作为设备在每个座位上连接诸如个人计算机之类的信息终端设备的情况不同，本发明能够避免增加会议室的设备成本。

根据以上卡式网络接口卡，由于 LAN 的主机是由连接卡式网络接口卡的信息终端设备组成的，所以能够在不提供专用设备作为主机的情况下达到构建 LAN 系统的目的。因此，在使用 LAN 的会议中，例如，能够进一步抑制会议室的设备成本。

根据以上卡式网络接口卡，在使用 LAN 的会议中，例如，与会者无需离开座位就能进行演示。

根据以上卡式网络接口卡，能够实现以下目的，即，主机能够准确接收通过无线 LAN 完成其网络设置的众多客户机的请求，并且该主机能够通过无线 LAN 准确接收设置信息请求。

根据以上卡式网络接口卡，在使用 LAN 的会议系统中，例如，实现以下目的，即，未安装演示应用程序软件的信息终端设备能够显示演示应用程序数据。另外，由于与会者无需执行启动演示应用程序软件的操作，所以能够实现以下目的，即，进一步减轻强加给参与者的负担。

其次，根据本发明的网络会议终端设备，能够实现以下目的，即，能够在不向出席使用无线 LAN 的会议的参与者强加负担的情况下，执行使用的网络设置，并且与作为设备在每个座位上安装信息终端设备的情况不同，本发明能够避免增加会议室的设备成本。

根据以上网络会议终端设备，由于无线 LAN 的主机也是由该网络会议终端设备组成的，所以能够实现以下目的，即，能够在不提供专用设备作为主机的情况下构建无线 LAN 会议系统。因此，能够进一步抑制会议室的设备成本。

根据以上网络会议终端设备，在使用无线 LAN 的会议中，例如，与会者无需离开座位就能进行演示。

根据以上网络会议终端设备，能够实现以下目的，即，主机能够准确接收已完成网络设置的众多客户机的请求，并且该主机能够准确接收用于设置网络的设置信息请求。

根据以上网络会议终端设备，在使用无线 LAN 的会议系统中，例如，能够实现以下目的，即，未安装演示应用程序软件的信息终端设备能够显示演示数据。另外，由于与会者无需执行启动演示应用程序软件的操作，所以能够实现以下目的，即，进一步减轻强加给参与者的负担。

其次，根据本发明的网络会议系统，能够实现以下目的，即，能够在不向参与者强加负担的情况下，执行网络设置，并且能够在不增加会议室的设备成本的情况下构建该系统。

根据以上网络会议系统，由于主机也是由与客户机相同的网络会议终端设备组成的，所以能够实现以下目的，即，无需提供专用设备作为主机，因此，能够进一步抑制会议室的设备成本。

根据以上网络会议系统，与会者无需离开座位就能进行演示。

根据以上网络会议系统，能够实现以下目的，即，主机能够准确接收已完成网络设置的众多客户机的请求，并且该主机能够准确接收用于设置网络的设置信息的请求。

根据以上网络会议系统，能够实现以下目的，即，使用未安装演示应用程序软件的信息终端设备的客户机或主机，能够显示演示数据。由于与会者无需执行启动演示应用程序软件的操作，所以能够进一步减轻强加给参与者的负担。

其次，根据本发明的另一种网络会议系统，能够实现以下目的，即，能够在不向与会者强加负担的情况下，执行客户机的网络设置，并且能

够在不增加会议室的设备成本的情况下构建该系统，同时参与者无需离开座位就能进行演示。

根据另一种网络会议系统，能够实现以下目的，即，通过无线 LAN，能够直接从图像显示设备向客户机传送与该图像显示设备上显示的演示数据相同的演示数据，然后在客户机上显示，并且通过无线 LAN，能够直接从客户机向图像显示设备传送演示数据，然后在图像显示设备上显示此类演示数据。

另外，根据另一种网络会议系统，能够实现以下目的，即，图像显示设备（主机）能够准确接收已完成网络设置的众多客户机的请求，并且该图像显示设备能够准确接收用于设置网络的设置信息请求。

此外，根据另一种网络会议系统，能够实现以下目的，即，使用未安装演示应用程序软件的信息终端设备的客户机和图像显示设备能够显示演示数据。由于与会者无需执行启动演示应用程序软件的操作，所以能够实现以下目的，即，进一步减轻强加给参与者的负担。

图 1

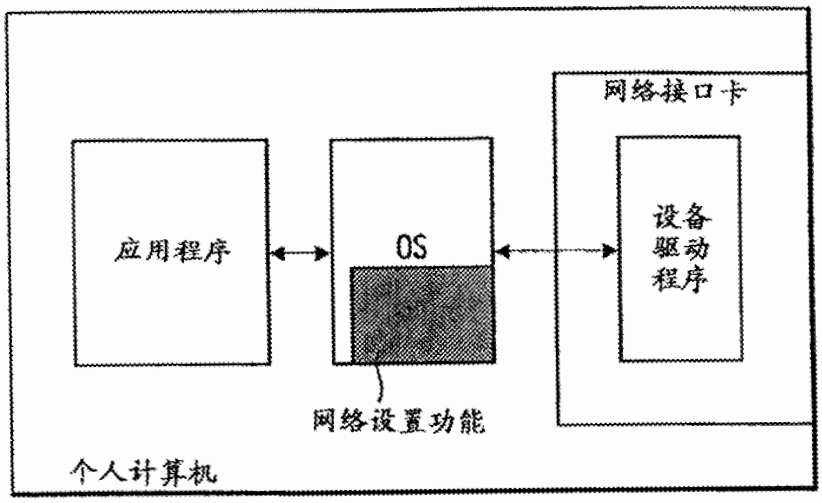


图 2

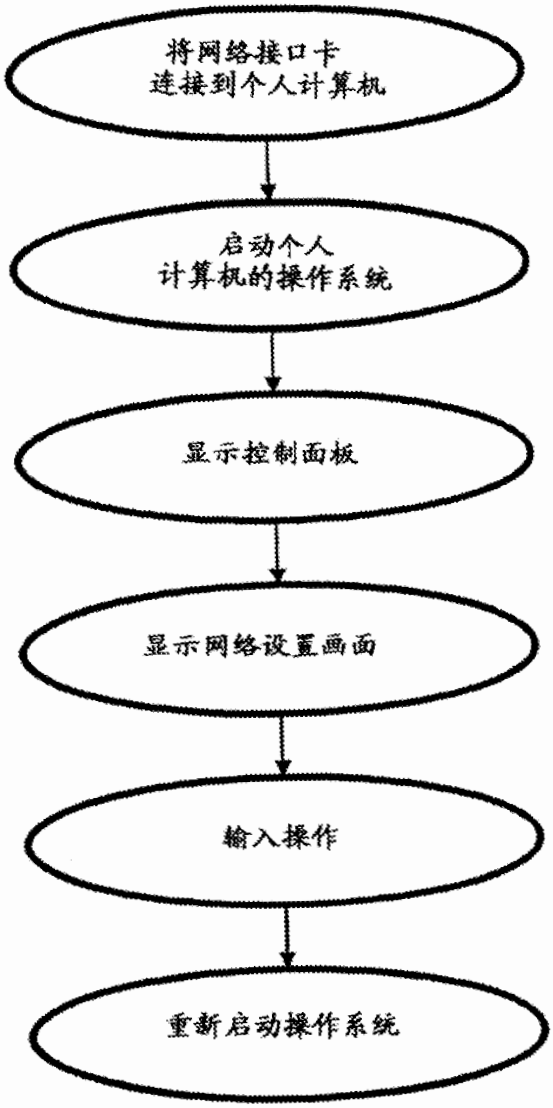

将网络接口卡
连接到个人计算机
启动个人
计算机的操作系统
显示控制面板
显示网络设置画面
输入操作
重新启动操作系统

图 3

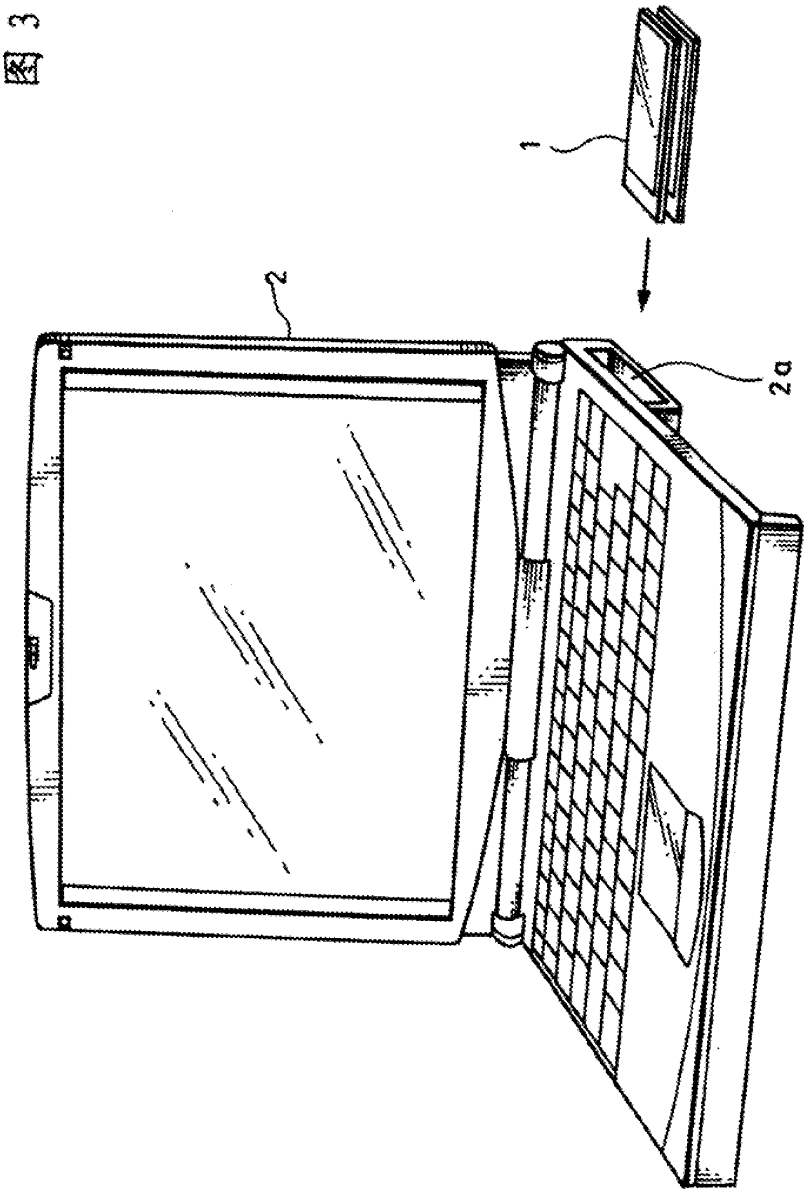


图 4

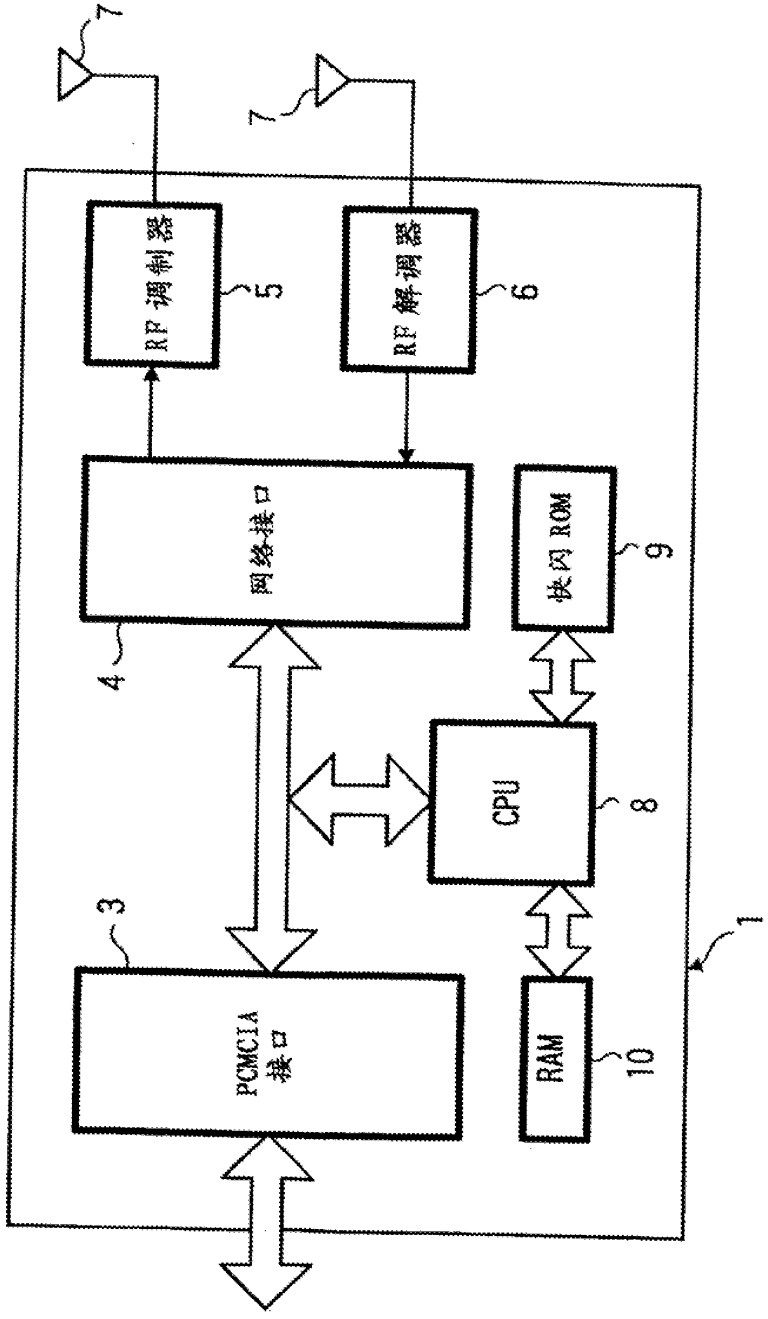
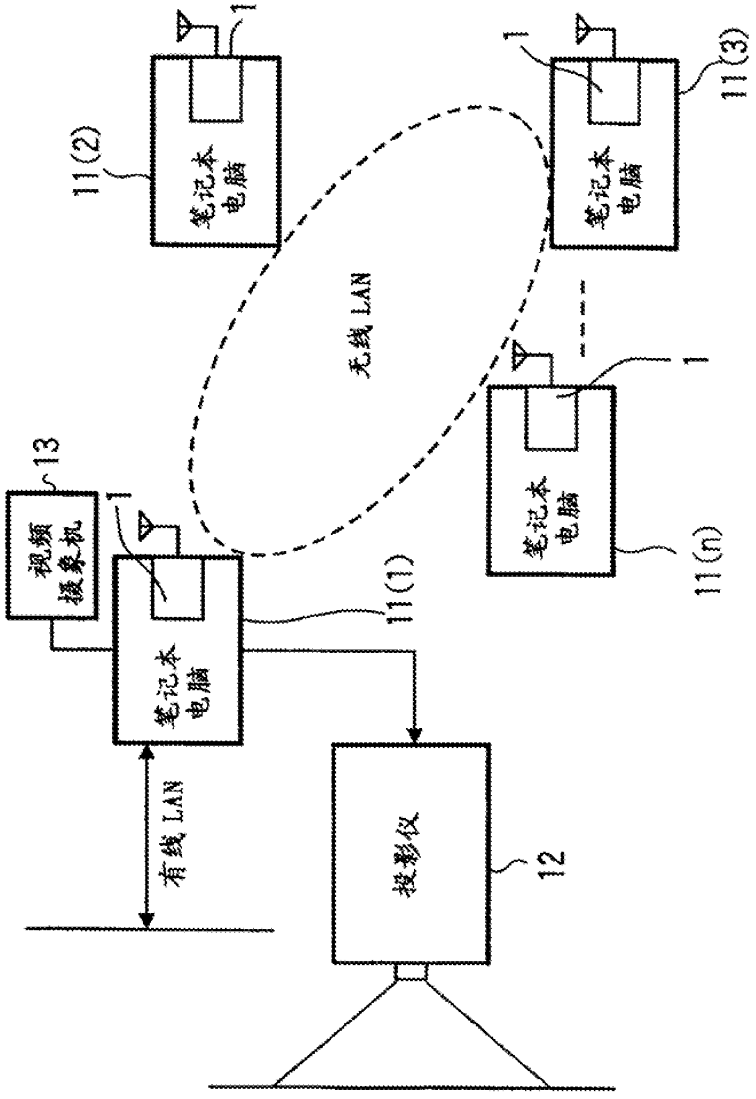


图 5



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图 6

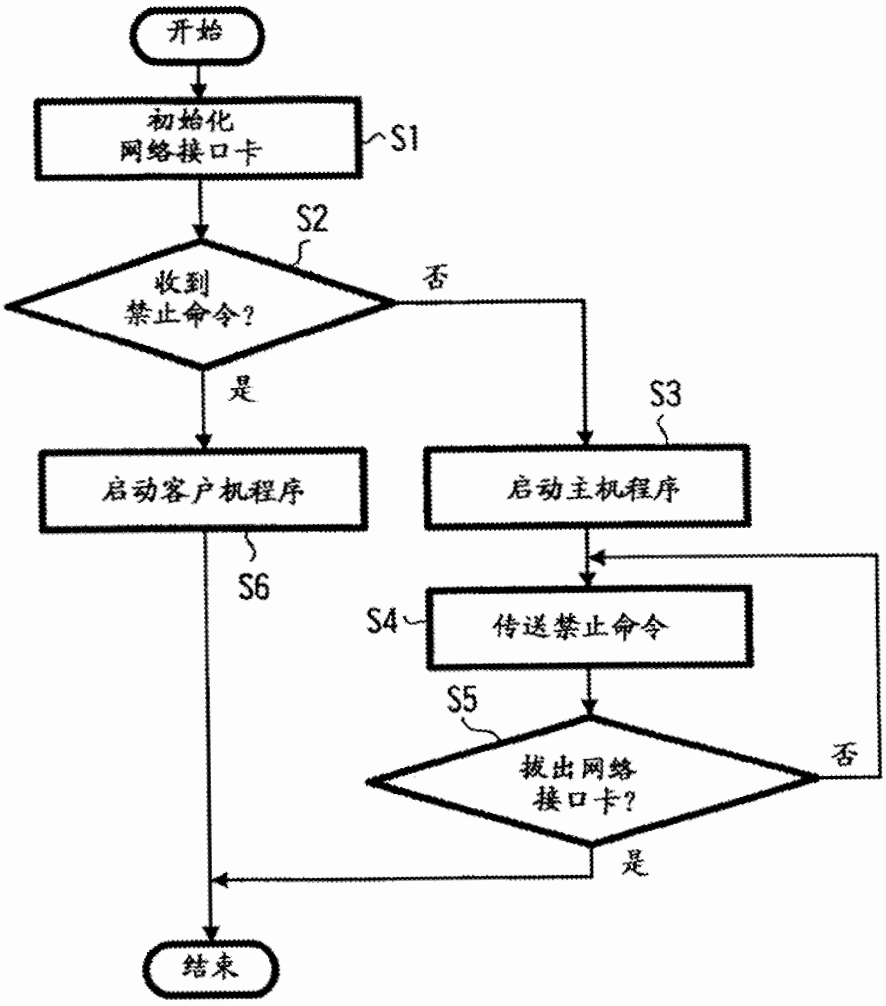

开始
初始化
网络接口卡
S1
S2
收到
禁止命令?
否
是
S3
启动客户机程序
启动主机程序
S6
S4
传送禁止命令
S5
拔出网络
接口卡?
否
是
结束

图 7

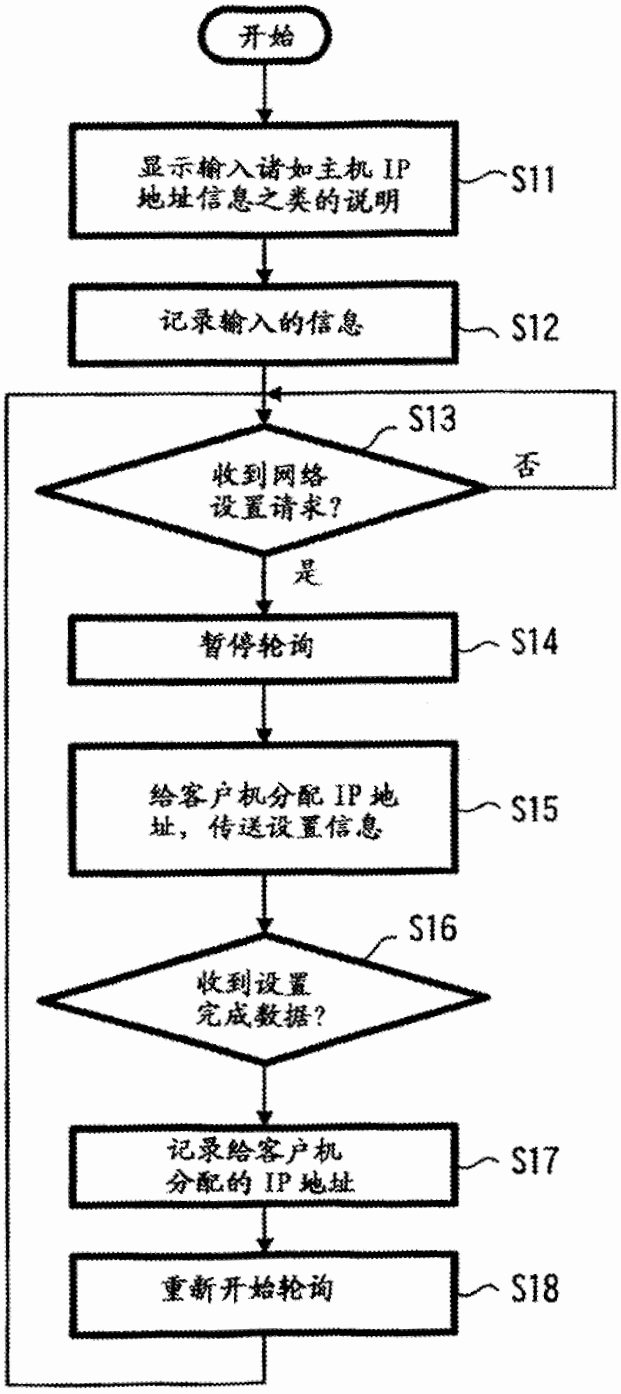

开始
显示输入诸如主机 IP 地址信息之类的说明
S11
记录输入的信息
S12
S13
收到网络设置请求?
否
是
暂停轮询
S14
给客户机分配 IP 地址，传送设置信息
S15
S16
收到设置完成数据?
记录给客户机分配的 IP 地址
S17
重新开始轮询
S18

图 8

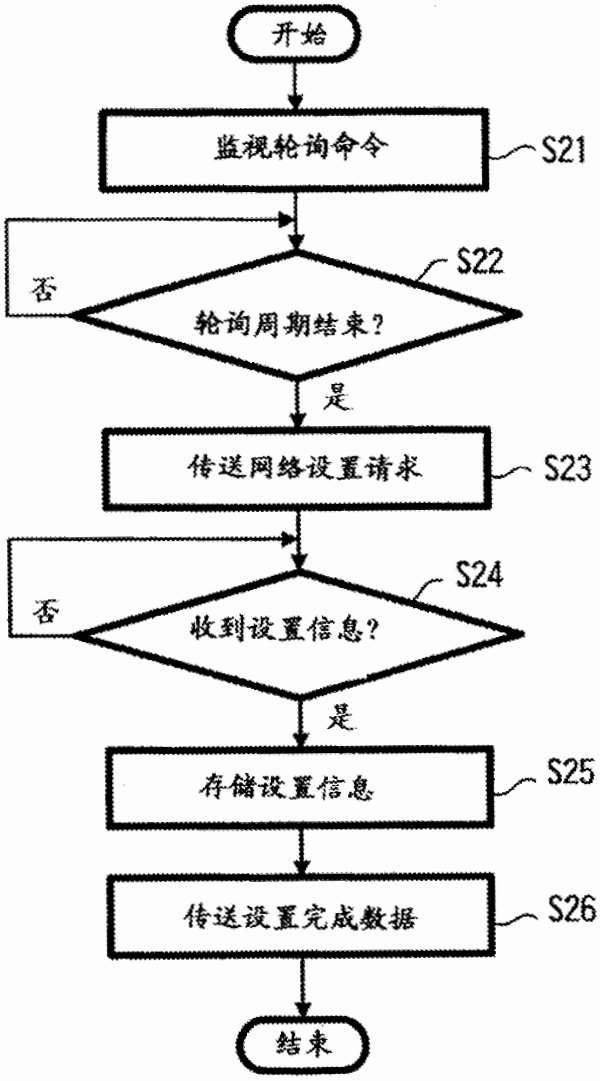

开始
监视轮询命令
S21
S22
否
轮询周期结束?
是
传送网络设置请求
S23
S24
否
收到设置信息?
是
存储设置信息
S25
传送设置完成数据
S26
结束

图 9

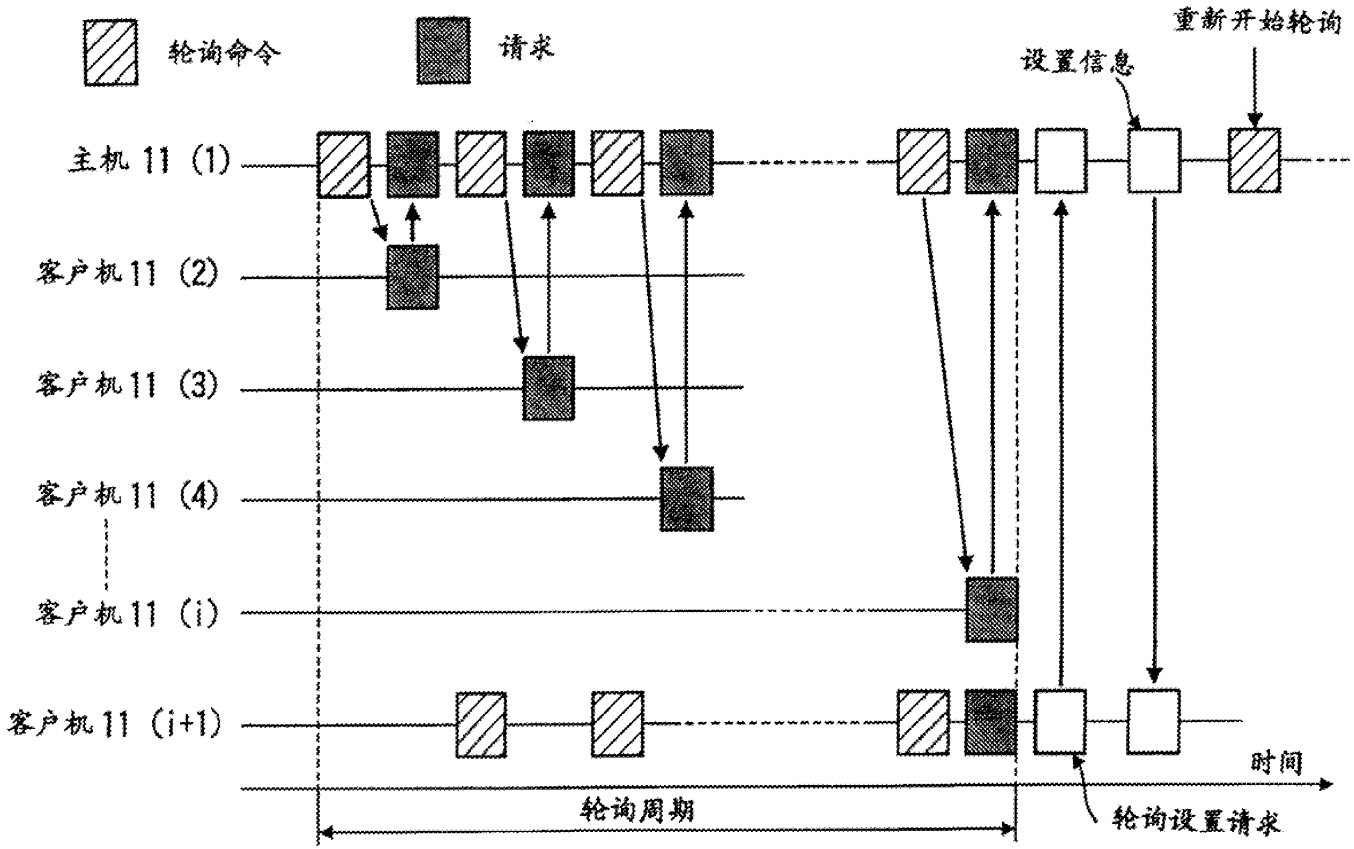

轮询命令
请求
设置信息
重新开始轮询
主机 11（1）
客户机 11（2）
客户机 11（3）
客户机 11（4）
客户机 11（i）
客户机 11（i+1）
时间
轮询周期
轮询设置请求

图10A

传输目的地的地址	传输源的地址	后继字节数	数据或命令	校验和

图10B

轮询结束
请求 IP 地址
完成设置 IP 地址

图 11

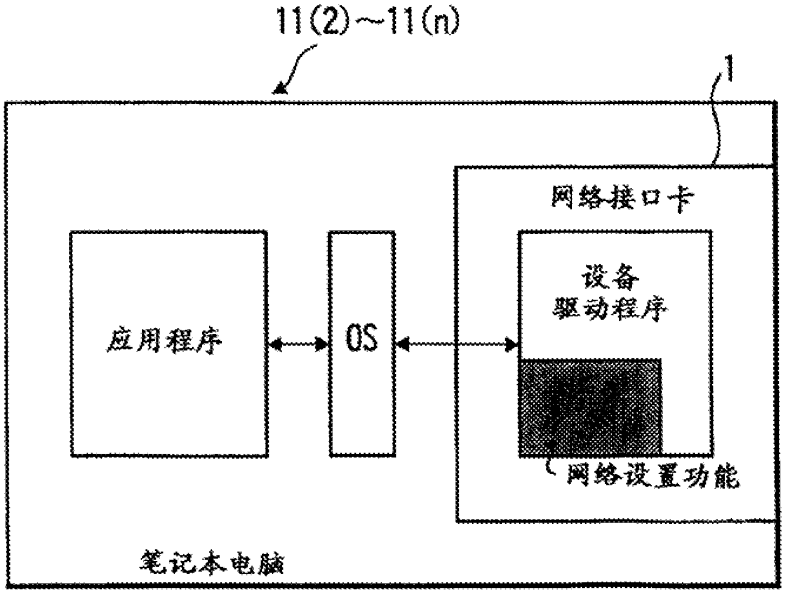


图 12

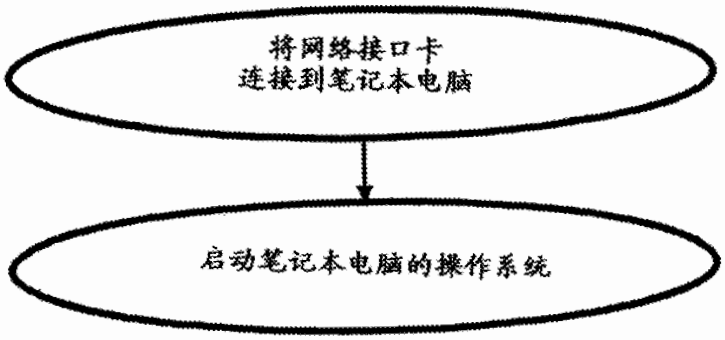


图 13

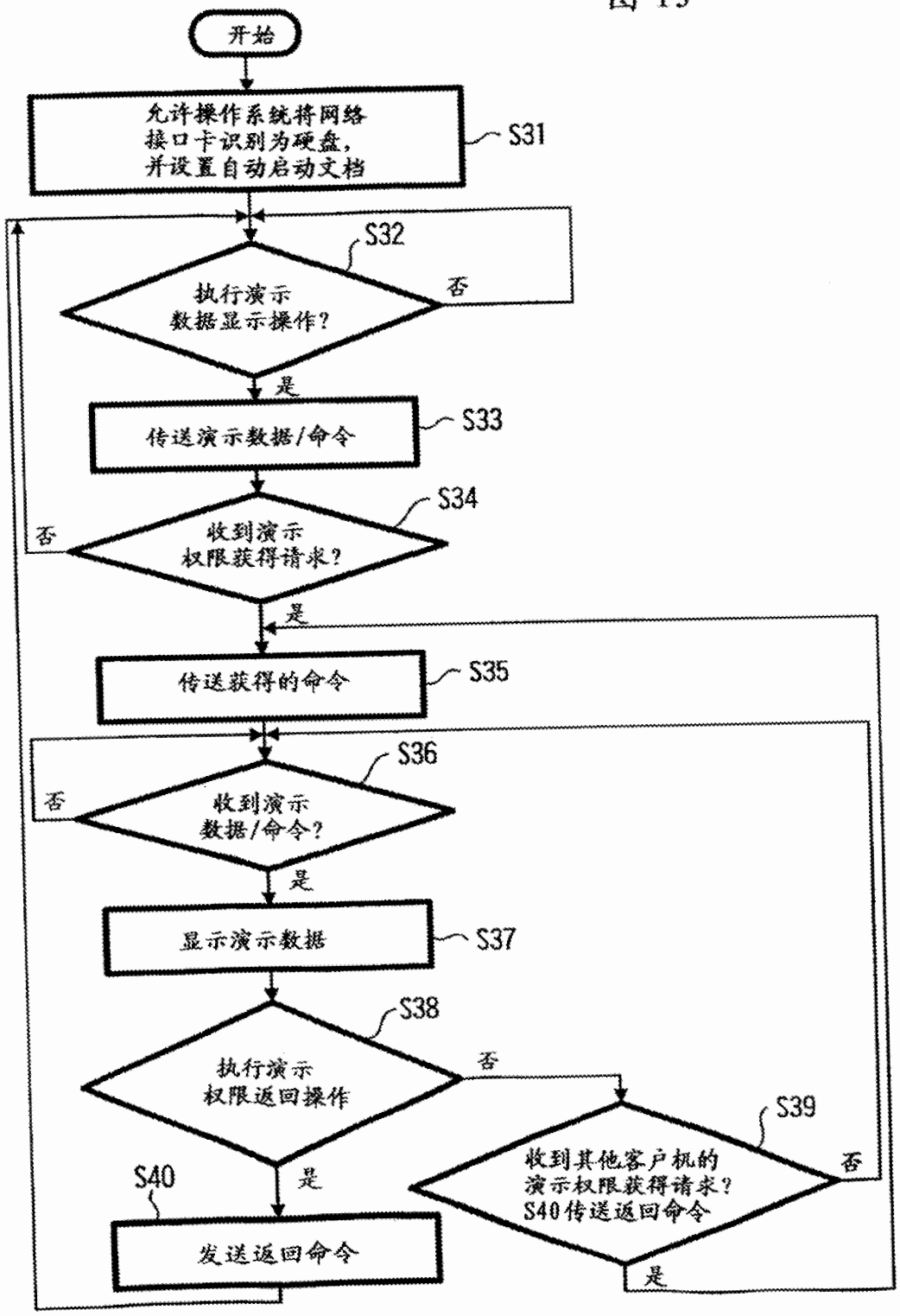

开始
允许操作系统将网络接口卡识别为硬盘，并设置自动启动文档
S31
S32
执行演示数据显示操作？
否
是
传送演示数据/命令
S33
S34
否
收到演示权限获得请求？
是
传送获得的命令
S35
S36
否
收到演示数据/命令？
是
显示演示数据
S37
S38
执行演示权限返回操作
否
S39
收到其他客户机的演示权限获得请求？S40传送返回命令
否
是
S40
是
发送返回命令

图 14

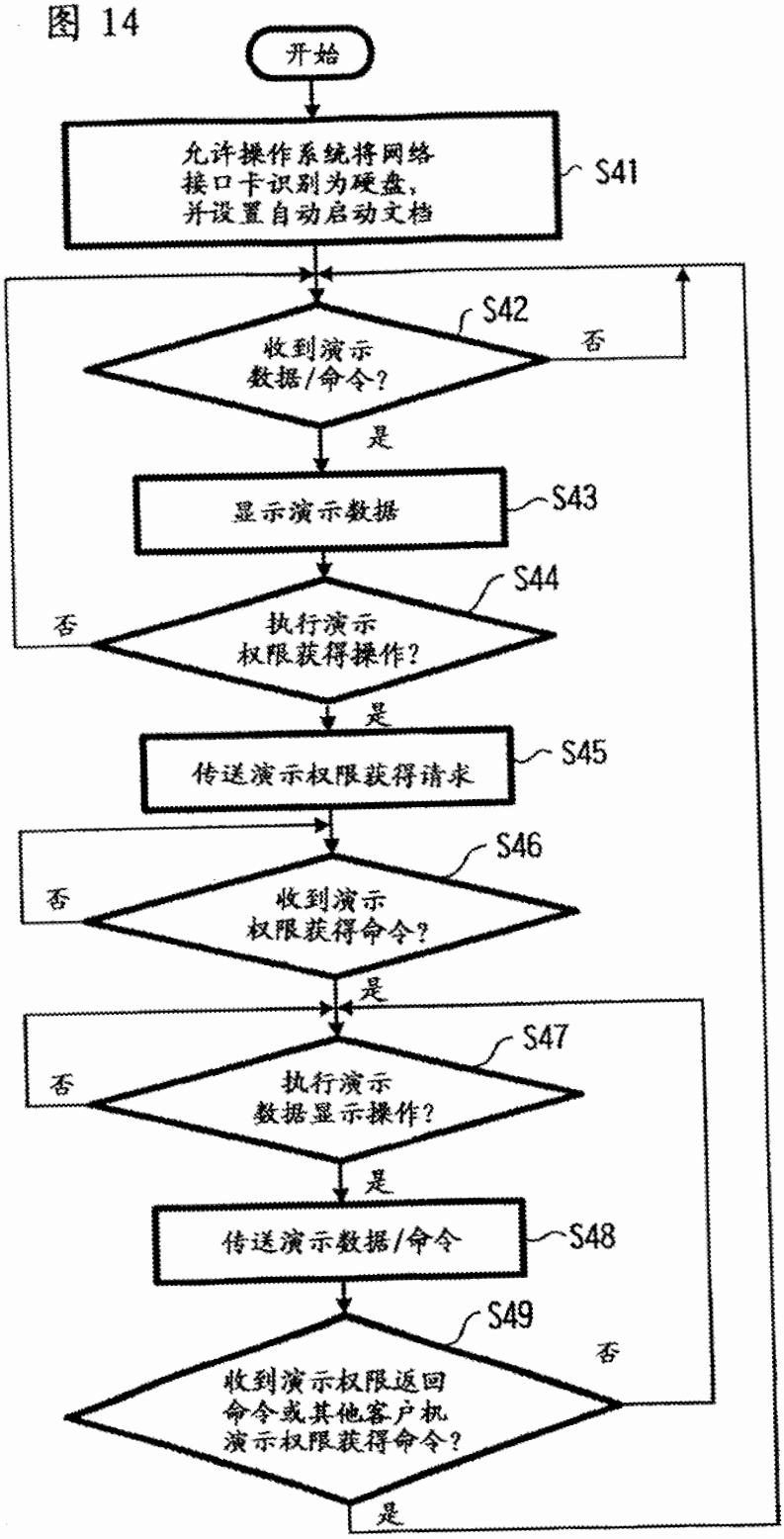

开始
允许操作系统将网络接口卡识别为硬盘，并设置自动启动文档
S41
收到演示数据/命令？
S42
否
是
显示演示数据
S43
执行演示权限获得操作？
S44
否
是
传送演示权限获得请求
S45
收到演示权限获得命令？
S46
否
是
执行演示数据显示操作？
S47
否
是
传送演示数据/命令
S48
收到演示权限返回命令或其他客户机演示权限获得命令？
S49
否
是

图 15

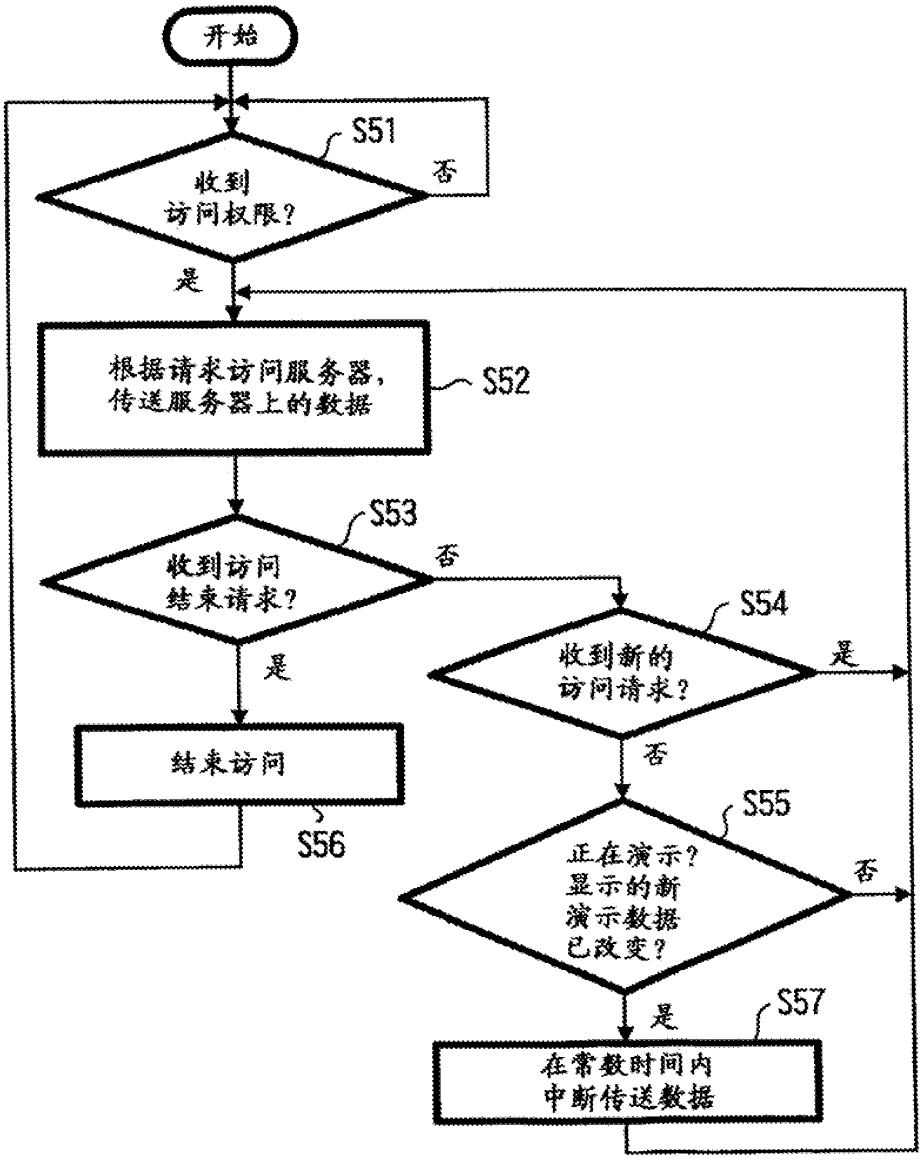

开始
S51
收到
访问权限?
否
是
根据请求访问服务器,
传送服务器上的数据
S52
S53
收到访问
结束请求?
否
是
结束访问
S56
S54
收到新的
访问请求?
是
否
S55
正在演示?
显示的新
演示数据
已改变?
否
是
S57
在常数时间内
中断传送数据

图 16

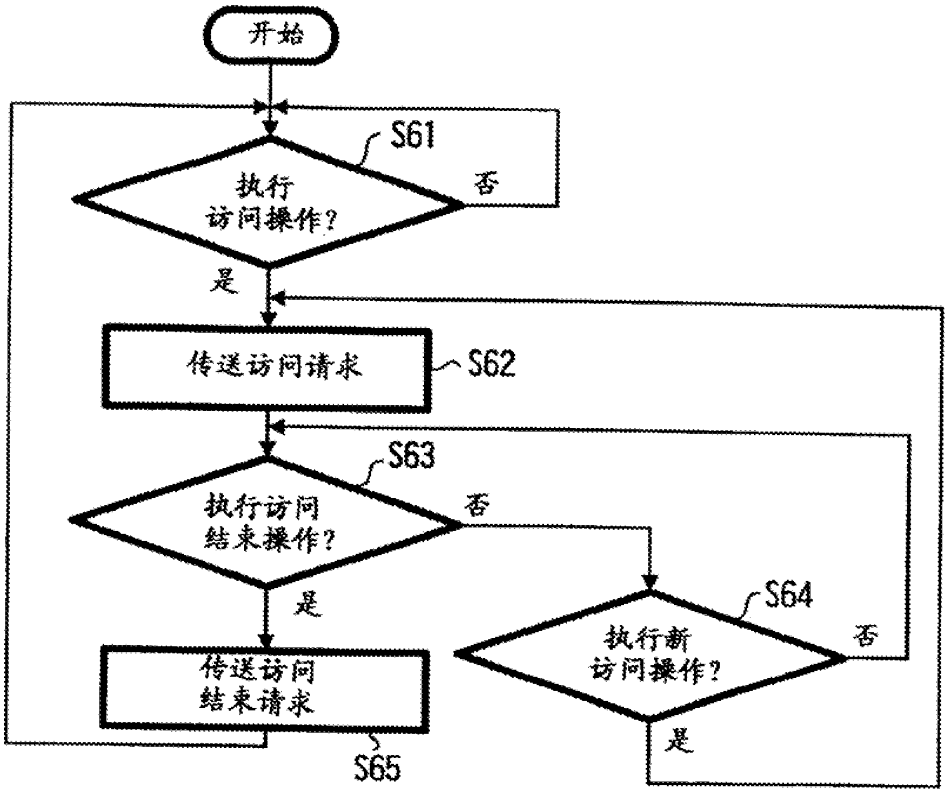
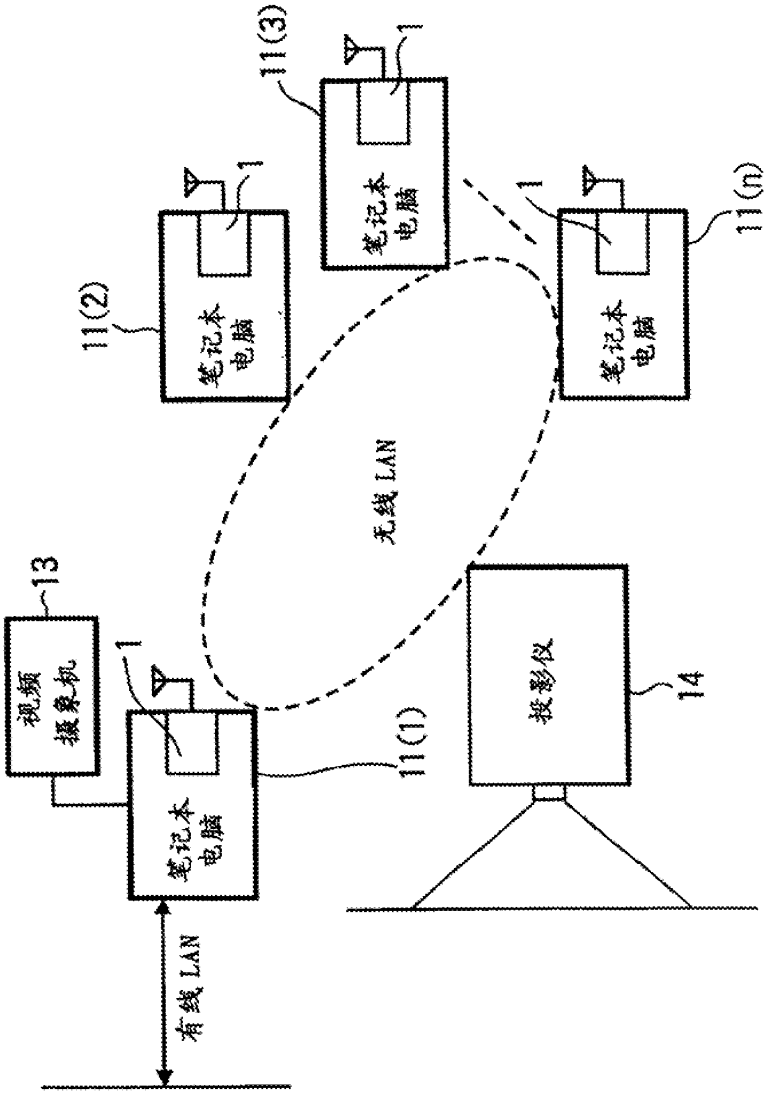

开始
S61
执行
访问操作?
否
是
传送访问请求
S62
S63
执行访问
结束操作?
否
是
传送访问
结束请求
S65
S64
执行新
访问操作?
否
是

图 17



Page 1713 of 3224

图 18

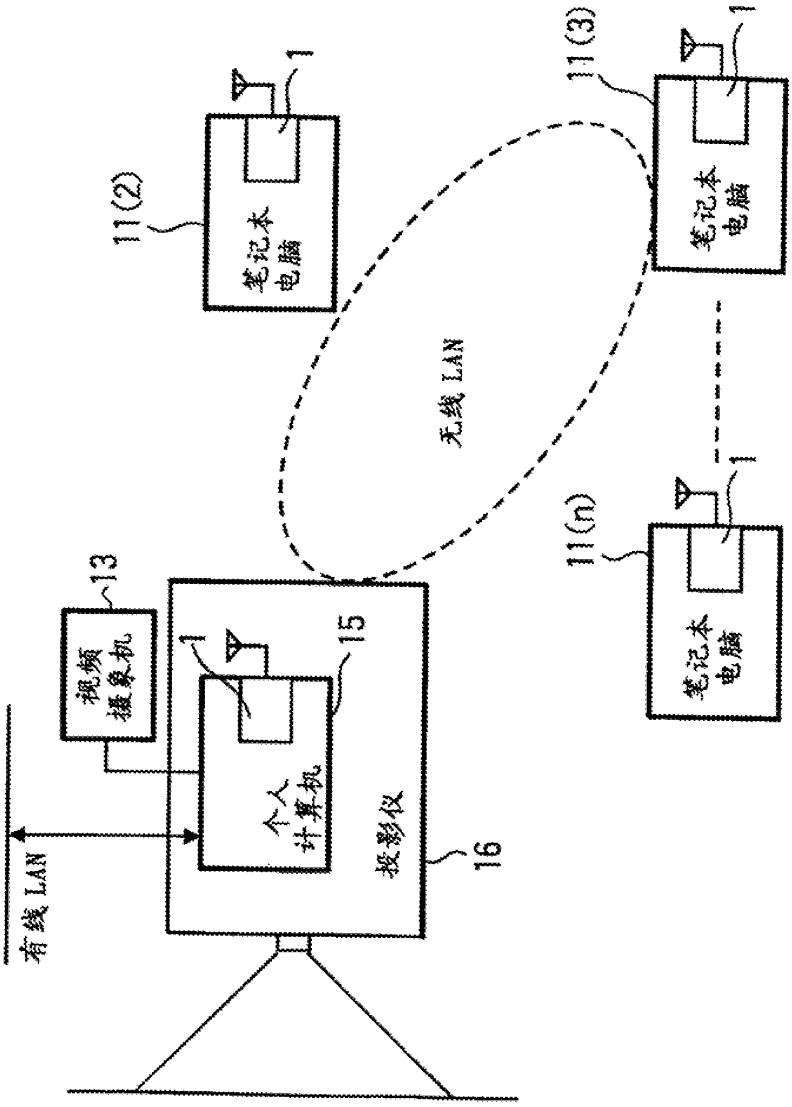
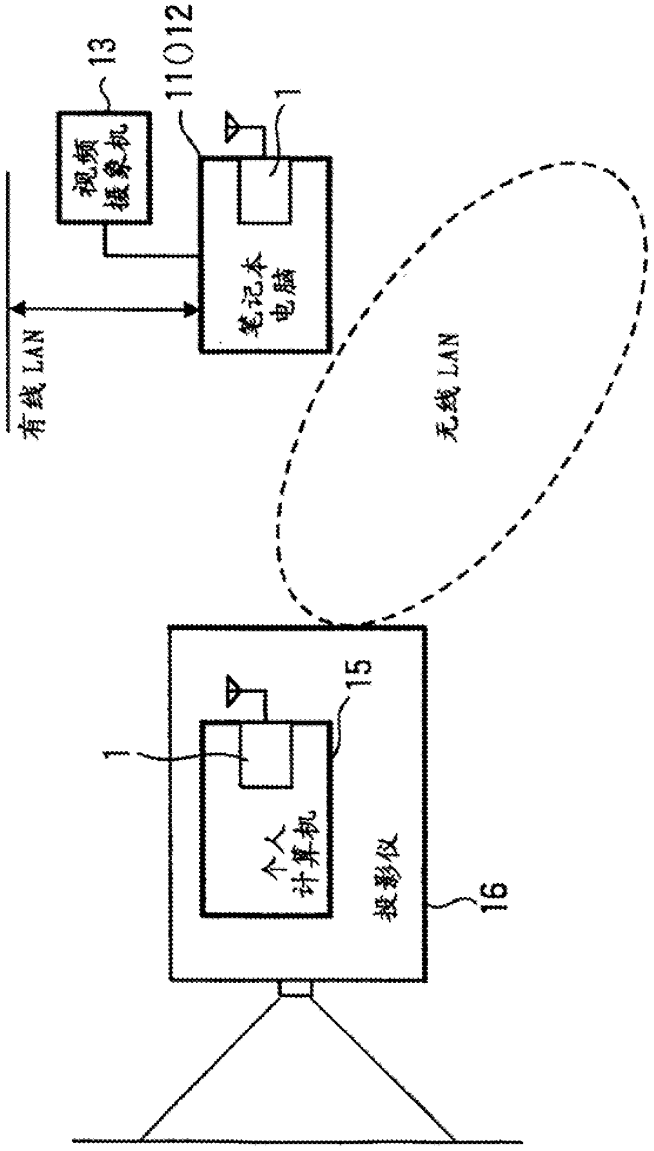

11(2)
笔记本电脑
1
11(3)
笔记本电脑
1
无线 LAN
11(n)
笔记本电脑
1
13
视频摄象机
1
15
个人计算机
投影仪
16
有线 LAN

图 19



参看号数描述

1 ... 网络接口卡
2 ... 笔记本电脑
2a ... PC卡插槽
3 ... PCMCIA接口
4 ... 网络接口
5 ... RF调制
6 ... RF解调
7 ... 天线
8 ... CPU
9 ... 快闪ROM
10 ... RAM
11(1) ... 无线LAN会议终端设备（主机）
11(2)到11(n) ... 无线LAN会议终端设备（客户机）
12,14,16 ... 投影仪
13 ... 视频摄象机
15 ... 个人计算机

Electronic Acknowledgement Receipt

EFS ID:	28254410
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:	03-FEB-2017
Filing Date:	03-MAR-2015
Time Stamp:	11:26:48
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	612252 ff236c0abe81f7534ecb4b2000da072b0d1563c6	no	4

Warnings:

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2	Foreign Reference	CN1689275A_filing.pdf	11341786 3231840f887b249753d6702db961f52e154d4682	no	57
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New International Application Filed with the USPTO as a Receiving Office

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

PTO/SB/08a (01-10)
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Application Number	14344836
Filing Date	2015-03-03
First Named Inventor	Koen Simon Herman BEEL
Art Unit	2181
Examiner Name	Henry Tsai
Attorney Docket Number	BEEL3004/BEU/TL

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	2	20050015719	A1	2005-01-20	MARCHON et al.	cited in EP Search Report
	3	20090300520	A1	2009-12-03	Ashutosh	
	4	20050122392	A1	2005-06-09	Johansen	
	5	20090092198	A1	2011-04-21	Miyata	

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	Art Unit	2181
	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

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	1476242	CN	A	2004-02-18	SEIKO EPSON CORP	English abstract of corresponding EP 1385336, cited in CN OA	☒
	2	2010/105335	WO	A1	2010-09-23	SMART TECHNOLOGIES ULC	cited in CN OA	☐
	3	102045864	CN	A	2011-05-04	NEC CASIO MOBILE COMM LTD	English abstract (Corresponds U.S. 2011/0092198), cited in CN OA	☒
	4	101631223	CN		2011-04-20	SHANGHAI HUAPING INFORMATION TECHNOLOGY CO LTD	Cited in CN OA dated 10-10-16, English abstract	☒
	5	101454762	CN		2013-06-12	SMART TECHNOLOGIES ULC	Cited in CN OA dated 10-10-16, English abstract	☒
	6	1550996	CN		2004-12-01	SEIKO EPSON CORP	Cited in CN OA dated 10-14-16, English abstract	☒
	7	101965609	CN		2011-02-02	SMART TECHNOLOGIES ULC	Cited in CN OA dated 10-14-16, English abstract	☒
	8	1385336	EP	A2	2004-01-28	SEIKO EPSON CORP		☐

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	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2181
	Examiner Name	Henry Tsai
	Attorney Docket Number	BEEL3004/BEU/TL

	1	European Extended Search Report dated November 3, 2016, for EP 16170760.9.	
	2	Chinese Office Action dated October 14, 2016, for CN 201280055744.2.	
	3	Chinese Office Action dated October 10, 2016, for CN 201280055667.0.	
	4	Office Action in corresponding U.S. app. 14/344,830 dated October 6, 2016.	
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	Application Number	14344836
	Filing Date	2015-03-03
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2181
	Examiner Name	Henry 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)	2017-01-06
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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(19) World Intellectual Property Organization
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(71) Applicant *(for all designated States except US)*: **SMART TECHNOLOGIES ULC** [CA/CA]; 3636 Research Road N.W., Calgary, Alberta T2L 1Y1 (CA).

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(75) Inventors/Applicants *(for US only)*: **BANERJEE, Shymmon** [CA/CA]; 175 Dalcastle Close N.W., Calgary, Alberta T3A 1Z4 (CA). **HILL, Douglas, Blair** [CA/CA]; 196 Hendon Drive N.W., Calgary, Alberta T2K 1Z2 (CA). **LABINE, David** [CA/CA]; 4811 49 Avenue N.W., Calgary, Alberta T3A 0R8 (CA). **MCELHINNEY, Mark** [CA/CA]; #208, 1414 17 St. S.E., Calgary, Alberta T2G 5S6 (CA). **KEENAN, Vaughn, E.** [CA/CA]; 319 Hampshire Place N.W., Calgary, Alberta T3A 5B3 (CA).

(74) Agents: **RUSTON, David, A.** et al.; Sim & McBurney, Sixth Floor, 330 University Avenue, Toronto, Ontario M5G 1R7 (CA).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

[Continued on next page]

(54) Title: PLUG-AND-PLAY INTERFACE DEVICE

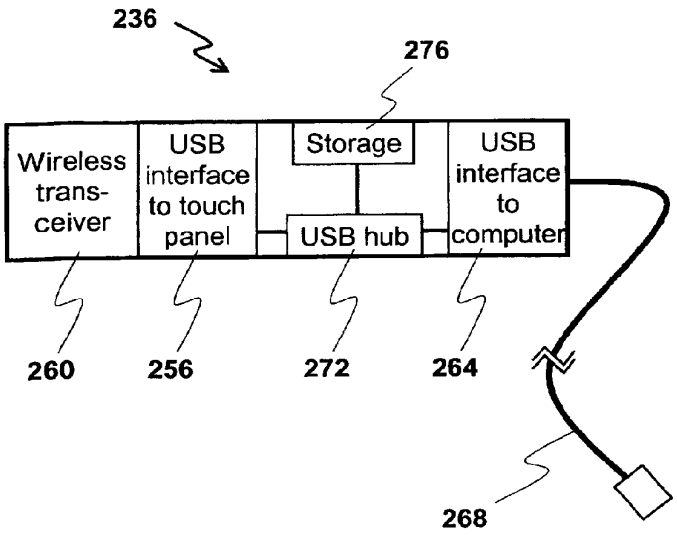


FIG. 5

(57) Abstract: A plug-and-play device comprises a first plug-and-play interface for establishing a connection with a first computing device and a second plug- and-play interface for establishing a connection with a second computing device. Storage stores code that is automatically executed by the second computing device when the plug-and-play device is connected to the second computing device via the second plug-and-play interface. The code when executed by the second computing device initiates a screen display data exchange between the first and second computing devices through the plug- and-play device. A controller controls the first plug-and-play interface, the second plug-and-play interface and the storage.

WO 2010/105335 A1

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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

— *with international search report (Art. 21(3))*

PLUG-AND-PLAY INTERFACE DEVICE

Related Application

[0001] The subject application is a continuation-in-part of U.S. Patent Application No. 11/420,600 to Hill et al. filed on May 26, 2006 for an invention entitled "Plug-And-Play Device And Method Of Using The Same", the contents of which are incorporated herein by reference.

Field

[0002] The subject application relates generally to computer peripheral devices and, more specifically, to a plug-and-play device and a method of using the same.

Background

[0003] Plug-and-play devices are well known and many types of plug-and-play standards exist, including for example 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. The functionality of common plug-and-play devices can include, but is not limited to, storage, input registration, image capturing, audio input and output, etc. The sets of functionality available on common plug-and-play devices are pre-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 to the connection. The operating system in response polls the plug-and-play device to determine what functionality is available on the plug-and-play device.

[0004] 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 computer loads the driver so that the functionality of the plug-and-play device can be accessed by the computer. If the operating system does not possess a

driver corresponding to the device class of the plug-and-play device, the operating system typically prompts the user to install the appropriate software to enable the computer to access the functionality of the plug-and-play device.

[0005] 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 until one is found that permits auto-execution of a driver installation program.

[0006] 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 on a computer to which the printer is connected. Once the drivers are installed on the computer, the printer is conditioned to a second mode, in which the printer behaves as a printer.

[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 connection of the plug-and-play device to the computer 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] When the plug-and-play device is a touch panel, calibration to map the coordinate system of the input field of the touch panel to the display coordinate system of the computer to which the plug-and-play device is connected is typically required in order to ensure proper registration of touch input. Following the calibration process, the calibration settings are registered and stored by the computer. Unfortunately, because the computer stores the calibration settings, when the touch panel is plugged into a computer to which it

was not previously connected, the calibration process must be carried out again in order to establish the calibration settings on the new computer.

Summary

[0009] Accordingly, in one aspect there is provided a plug-and-play device comprising: a first plug-and-play interface for establishing a connection with a first computing device; a second plug-and-play interface for establishing a connection with a second computing device; storage storing code that is automatically executed by the second computing device when said plug-and-play device is connected thereto via said second plug-and-play interface, said code when executed initiating a screen display data exchange between said first and second computing devices; and at least one controller controlling said first plug-and-play interface, said second plug-and-play interface and said storage.

[0010] In one embodiment, the first plug-and-play interface comprises a wireless transceiver and establishes a wireless connection with the first computing device. The wireless connection may be a secure wireless connection. In this case, the storage further stores at least one of at least one key, at least one biometric and at least one code that is used to establish the secure wireless connection. The plug-and-play device further comprises a physical connection to the second computing device. The physical connection may be in the form of a universal serial bus cable or the plug-and-play device may be configured as a dongle.

[0011] In another embodiment, the plug-and-play device comprises a physical connection to the first computing device and a physical connection to the second computing device. Each physical connection may be in the form of a universal serial bus cable.

[0012] The screen display data exchange may comprise transmission of second computing device display screen data to the first computing device. The second computing device display screen data is compressed prior to transmission to the first computing device. Differences between previously

transmitted second computing device display screen data and current second computing device display screen data are transmitted. The code when executed may also permit file sharing between the first and second computing devices through the plug-and-play device.

[0013] The screen display data exchange alternatively may comprise transmission of first computing device display screen data to the second computing device. Similarly, the first computing device display screen data is compressed prior to transmission to the second computing device. Differences between previously transmitted first computing device display screen data and current first computing device display screen data are transmitted.

Brief Description of the Drawings

[0014] Embodiments will now be described with reference to the accompanying drawings in which:

[0015] Figure 1 shows a plug-and-play device comprising a touch panel, a controller and a cable, coupled to a computer;

[0016] Figure 2 is a schematic diagram of the cable of Figure 1;

[0017] Figure 3 is a flow chart of the general operation of the plug-and-play device of Figure 1;

[0018] Figure 4 shows another plug-and-play device allowing for screen sharing between a master computer and a remote computer;

[0019] Figure 5 is a schematic diagram of the plug-and-play device of Figure 4;

[0020] Figure 6 is a flow chart of the general operation of the plug-and-play device of Figure 4;

[0021] Figure 7 shows the plug-and-play device of Figure 4 with a touch panel and projector communicating with the master computer;

[0022] Figure 8 shows yet another plug-and-play device allowing for bi-direction screen sharing between a master computer and a remote computer;

[0023] Figure 9 is a schematic diagram of the plug-and-play device of Figure 8;

[0024] Figure 10 is a flow chart of the general operation of the plug-and-play device of Figure 8; and

[0025] Figure 11 shows the plug-and-play device of Figure 8 with a touch panel and projector communicating with the master computer.

Detailed Description of the Embodiments

[0026] Turning now to Figure 1, a system or network 20 of operatively connected components is illustrated. As can be seen, system 20 comprises a plug-and-play (PnP) device 24 for receiving and digitizing input. In this embodiment, the plug-and-play device 24 comprises an interactive input system that includes a touch panel 28, a controller 32 and a cable 36. Touch panel 28 may be of the type employing analog resistive or machine vision technology to register pointer input such as those disclosed in U.S. Patent Nos. 5,448,263; 6,141,000; 6,337,681; 6,747,636; 6,803,906; 7,232,986; 7,236,162; and 7,274,356 and in U.S. Patent Application Publication No. 2004/0179001 assigned to SMART Technologies ULC of Calgary, Alberta, Canada, assignee of the subject application, the contents of which are incorporated by reference. Alternatively, touch panel 28 may be of the type employing electromagnetic, capacitive, acoustic or other technologies to register pointer input. The controller 32 controls the operation of the touch panel 28 and is in communication with a computer 40 via the cable 36. The computer 40 is also connected to a projection unit 44 such as for example, a liquid crystal display (LCD) projector, via a video graphics array (VGA) cable 48 and controls the LCD projector 44. In response to image data received from the computer 40, the LCD projector 44 projects images onto a touch surface 46 of the touch panel 28. The LCD projector 44 may be positioned in front of or behind the touch panel 28.

[0027] The touch panel 28 provides a user with the ability to interact with the image projected onto the touch surface 46 of the touch panel 28 and inject input into an application program running on the computer 40 using an active pointer (e.g. a pointer that emits light, sound or other signal) or a passive

pointer (e.g. a finger, cylinder or other object). Although the touch panel 28 requires no extra software other than that provided by the operating system of the computer 40 in order to work as a mouse, the functionality of the touch panel 28 can be greatly enhanced by additional software not available on the operating system of the computer 40, as will be described below.

[0028] 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 enables the controller 32 to relay absolute position information for a pointer contacting the touch surface 46 of the touch panel 28 along with basic mouse functions. The SMARTBoard HID profile is a device class that enables enhanced functionality for the touch panel 28. The enhanced functionality comprises all of the functionality available in the absolute mouse HID device class as well as inking information, additional tool information (buttons, eraser, pen 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.

[0029] The components of the cable 36 are better illustrated in Figure 2. As can be seen, the cable 36 comprises a USB hub component 52 having a USB interface 56 for connection to a USB cable segment 60 that extends to the touch panel 28, and a USB interface 64 for connection to a USB cable segment 68 that extends to the computer 40. Both USB interfaces 56, 64 are in communication with a USB hub 72. Also in communication with the USB hub 72 is storage 76, namely flash memory, solid-state memory or other suitable computer memory. The storage 76 is configured to operate in accordance with a mass storage device and defines itself as compact disk read only memory (CD-ROM) according to the compact disk ("CD") HID profile. Storage 76 stores a set of software applications, including a user application (SMARTBoardTools.exe), a service application (SMARTBoardService.exe), a

launcher application (SBLauncher.exe), a calibration application (SMARTBoardCalibrate.exe) and an autorun feature (autorun.inf) for a Windows® operating system file that references the launcher application. Further, the storage 76 stores calibration settings associated with the configuration of the system 20. In particular, the calibration settings include data for mapping touch coordinates generated by the touch panel 28 in response to pointer contacts with the touch surface 46 to the display coordinate system of the computer 40.

[0030] The SMARTBoardTools.exe user application permits a richer set of features than basic mouse functionality. In this embodiment, the SMARTBoardTools.exe user application 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 and displayed on the touch surface 46 of the touch panel 28.

[0031] The method of operation of the plug-and-play device 24, when the plug-and-play device 24 is connected to a new computer 40 that has not been previously connected to the plug-and-play device, is shown in Figure 3. When a session is commenced and 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 the controller 32, the USB hub 72 queries both the storage 76 and the controller 32 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, in the initial mode, responds by indicating that it supports the absolute mouse HID profile and the SMARTBoard HID profile.

[0032] The computer 40, upon receiving the available HID profiles, detects that functionality corresponding to the absolute mouse HID profile, the SMARTBoard HID profile and CD HID profile is available (step 112). The

computer 40 then loads the drivers for the devices recognized by the operating system for which the operating system has drivers, in this example the absolute mouse HID and CD HID (step 116). As each of these sets of functionality is detected by the computer 40, the computer 40 recognizes them as separate devices. The computer 40 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 plug-and-play device 24 which is recognized as a CD HID device, the next available drive letter (step 120).

[0033] Computer 40 is configured as the majority of computers are by default; that is, the computer 40 is configured to search CD HID devices for an autorun.inf file that will direct the computer 40 to automatically execute a specific application upon connection to a CD HID device. Accordingly, the computer 40 queries the plug-and-play device 24 that has been recognized as a CD HID device for an autorun.inf file and upon receiving the autorun.inf file, 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 computer operating system.

[0034] 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 launcher application from the storage 76, along with a set of corresponding dynamic link libraries ("DLLs"), and executes the SBLauncher.exe launcher application (step 128). The SBLauncher.exe launcher application, when executed, directs the computer 40 to copy the SMARTBoardTools.exe user application and the SMARTBoardService.exe service application, along with some associated DLLs, from the storage 76 to a temporary directory on the computer 40 and then execute the SMARTBoardTools.exe user and SMARTBoardService.exe

service applications (step 132). Upon execution of the SMARTBoardService.exe service application, the SBLauncher.exe launcher application terminates execution and the SMARTBoardService.exe service application directs the computer 40 to send a command to the controller 32 to switch the controller to the SMARTBoard HID mode (step 136).

[0035] Upon launch, the SMARTBoardTools.exe user application queries and obtains from storage 76 the calibration settings and other settings (step 140). The calibration settings enable the SMARTBoardTools.exe user application to map touch input generated by the touch panel 28 in response to pointer contacts with the touch surface 46 to the display coordinate system of the computer 40. The other settings include pen tray settings, COM port settings, contact filter settings and user settings for 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 user 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 a directory ("C:\Documents and Settings\<user name>\Application Data\SMART Technologies\SMARTBoard Software\") during execution of the SMARTBoardTools.exe user application, where <user name> is the login name of the current user.

[0036] Upon obtaining the calibration settings, the SMARTBoardTools.exe user application maps touch input generated by the touch panel 28 in response to pointer contacts with the touch surface 46 to the display coordinate system of the computer 40. In this manner, the user is able to interact effectively with the image projected onto the touch surface 46 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\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.

[0037] 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 from the computer 40, the computer 40 notifies the SBLauncher.exe launcher application (step 144). The SBLauncher.exe launcher application in turn proceeds to terminate execution of and delete the SMARTBoardTools.exe user application, the SMARTBoardService.exe service application, the various related DLLs and settings from the temporary locations on the computer 40 and then does the same for itself (step 148). Before termination of the SBLauncher.exe launcher application, the SBLauncher.exe launcher application writes the user settings stored in the "C\Documents and Settings\<user name>\Application Data\SMART Technologies Inc.\SMARTBoard Software\" directory to XML files which it then stores in storage 76 of the plug-and-play device 24. The SBLauncher.exe launcher application then deletes the user settings from the directory and those stored in the registry. Once the settings and files are deleted from the computer 40, the SBLauncher.exe launcher application places an entry in the HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion \RunOnce registry key which tells Windows to delete the SBLauncher.exe launcher application when the user logs in next, and then terminates execution. If the user stops the SMARTBoard software by closing the SMARTBoardTools.exe user application, then the SBLauncher.exe launcher application executes the instance of itself found in the storage 76 of the plug-and-play device 24. Upon execution of the SBLauncher.exe launcher application instance from the plug-and-play device 24, the instance of the SBLauncher.exe launcher application stored on the computer 40 is deleted.

[0038] As noted above, in order for touch input generated by the touch panel 28 in response to pointer contacts with the touch surface 46 to be mapped to the display coordinate system of the computer 40, the system 20 is

calibrated. As the spatial relation between the image projected onto the touch surface 46 of the touch panel 28 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 calibration application is launched. Once the SMARTBoardCalibrate.exe calibration application is launched, the user is prompted to touch a number of points on the image that is projected onto the touch surface 46 of the touch panel 28. The resulting touch panel output is used to determine calibration settings which map the raw touch coordinates generated by the touch panel 28 in response to the pointer contacts on the touch surface 46 to the display coordinate system of the computer 40. The calibration settings are then recorded in the Windows® INI file so that they can be used by other computers to map raw touch coordinates generated by the touch panel 28 in response to the pointer contacts on the touch surface 46 to the display coordinate system of the computer 40. This process allows for calibration at system installation and subsequent use of the calibration settings by all users of the system 20.

[0039] Turning now to Figure 4, another system or network 220 of operatively connected components is shown. As can be seen, system 220 comprises a plug-and-play device 236, a master computer 238 and at least one remote computer 240. The plug-and-play device 236 is physically connected to the remote computer 240 and communicates with the master computer 238 over a wireless communications link. In this embodiment, plug-and-play device 236 captures and compresses screen display data generated at the remote computer 240 and allows screen sharing between the remote computer 240 and the master computer 238 by automatically launching software stored on the plug-and-play device 236.

[0040] In this embodiment, the master computer 238 comprises a wireless communication device 238a, for example a radio frequency (RF) communication device such as a Bluetooth™, WiFi or other RF adapter, or an infrared (IR) communication device. The master computer 238 also runs a

mobile device manager software application to accept and manage connections from the remote computer 240, provide screen sharing functionality, allow remote control from the remote computer 240, and optionally, provide the remote computer 240 with Internet access.

[0041] The components of the plug-and-play device 236 are better illustrated in Figure 5. As can be seen, the plug-and-play device 236 comprises an interface 256 in the form of a USB interface to wireless communication device adapter connected to a wireless transceiver 260. Similar to wireless communication device 238a, the wireless transceiver 260 is, for example, an RF communication device such as a Bluetooth™, WiFi or other RF adapter, or an infrared (IR) communication device. The wireless communication device 238a and wireless transceiver 260 are paired to enable a peer-to-peer wireless connection between the master computer 238 and the remote computer 240 to be established. The plug-and-play device 236 also comprises an interface 264 in the form of a USB interface to computing device adapter. The interface 264 comprises a port (not shown) to receive a cable segment 268 thereby to enable the physical connection to the remote computer 240 to be made. Both interfaces 256 and 264 are also in communication with a controller 272 in the form of a USB hub.

[0042] Controller 272 also communicates with storage 276 that is configured to store and automatically launch software applications thereon via an autorun feature that the operating system of the remote computer 240 supports. Similar to the previous embodiment, storage 276 is flash memory, solid-state memory or other non-volatile computer memory. The storage 276 is configured to operate in accordance with a mass storage device and defines itself as compact disk read only memory (CD-ROM). Storage 276 stores an executable launcher application, LinQLauncher.exe and may also store one or more access codes, biometrics or keys to automatically form a secure encrypted and authenticated wireless network connection with the master computer 238.

[0043] The operation of the system 220, when a peer-to-peer wireless connection between the master computer 238 and the remote computer 240 is

established, will now be described with particular reference to Figure 6. When the plug-and-play device 236 is physically connected to the remote computer 240 via the cable segment 268 (step 304) and the connection of the plug-and-play device 236 is detected by the operating system of the remote computer 240, the remote computer 240 queries the plug-and-play device 236 to determine what functionality is provided by the plug-and-play device 236 (step 308). In particular, the controller 272 queries the wireless transceiver 260 and the storage 276 to determine what profiles or connections are available. In this embodiment, the storage 276 responds by indicating that it supports the mass storage device and the wireless transceiver 260 responds by indicating its device type, interface profile and other parameters such as for example wireless network protocol, wireless network speed, encryption keys, biometrics, etc. The plug-and-play device 236 then returns the determined functionality information to the remote computer 240.

[0044] The remote computer 240, upon receiving the functionality information from the plug-and-play device 236, determines that mass storage device and wireless communications functionality for the plug-and-play device 236 is available (step 312). The remote computer 240 then loads at least the driver for the mass storage device recognized by its operating system and initializes the plug-and-play device 236 (step 316). The remote computer 240 then assigns the plug-and-play device 236 which is recognized as a mass storage device the next available drive letter (step 320).

[0045] The remote computer 240, similar to the previous embodiment, is configured as the majority of computers are by default; that is, the remote computer 240 is configured to search mass storage devices for a file name that will direct the remote computer 240 to automatically execute instructions contained therein upon connection to a mass storage device. In this embodiment, the remote computer 240 queries the plug-and-play device 236 for the autorun.inf file and upon receiving the autorun.inf file, loads and executes the instructions contained therein (step 324).

[0046] The autorun.inf file contains a pointer to the executable launcher application, LinQLauncher.exe stored in the storage 276. Upon parsing the

autorun.inf file, the remote computer 240 uses the pointer to load a LinQ software application from the storage 276 (step 328). The LinQLauncher.exe application directs the remote computer 240 to copy all necessary files of the LinQ software application from storage 276 to a temporary directory on the remote computer 240 and then start the LinQ software application (step 332). The LinQ software application is used for setting up and managing the peer-to-peer wireless connection on the remote computer 240, screen sharing and communications between the remote computer 240 and the master computer 238.

[0047] Upon launch, the LinQ software application loads the necessary driver for the wireless transceiver 260, configures the wireless transceiver 260, finds the master computer 238 and establishes the peer-to-peer wireless connection between the LinQ software application and the mobile device manager application running on the master computer 238 (step 337). The LinQ software application, which manages the peer-to-peer wireless connection on the remote computer 240, then reads the access codes, biometrics or keys from the storage 276. The access codes, biometrics or keys are in turn exchanged with the master computer 238 and used as a parameter to create a secure authenticated and encrypted peer-to-peer wireless connection. The mobile device manager application running on the master computer 238 manages the peer-to-peer wireless connection on the master computer 238. In cases where multiple systems 220 may be operating, an ad-hoc network identifier may be necessary to allow the plug-and-play device 236 to determine the appropriate network to which to connect. In such cases, the ad-hoc network identifier is configured to be read from storage 276 in similar manner to the access codes, biometrics or keys.

[0048] Once the remote computer 240 is connected to the master computer 238 over the peer-to-peer wireless connection, the remote computer 240 may send a request to share the screen display data of the remote computer 240 to the master computer 238. If a request to share the screen display data is sent to the master computer 238 and accepted, the screen display data displayed on the remote computer 240 is compressed using a

suitable compression algorithm such as for example MJPEG compression. The compressed screen display data is then compared with previous screen display data sent to the master computer 238 in the same peer-to-peer wireless connection session to detect differences in the screen display data. The detected differences are then sent to the master computer 238 via the peer-to-peer wireless connection and displayed on the screen of the master computer 238. The master computer 238 passes input events, such as keyboard, mouse, trackball and/or pen-touch events, that it receives to the remote computer 240 thereby to remotely control the remote computer 240 (step 339). As will be appreciated, by compressing the screen display data of the remote computer 240, the time required to transmit the screen display data to the master computer 238 is reduced. Also, compressing the screen display data and only transmitting differences between screen display data, reduces the amount of screen display data that needs to be transmitted to the master computer 238 during screen sharing. This of course reduces the required transmission bandwidth required for screen sharing and thus, decreases latency.

[0049] When the peer-to-peer wireless connection is established between the master computer 238 and the remote computer 240, those skilled in the art will appreciate that, besides sharing the screen display data of the remote computer 240, file sharing between the master computer 238 and the remote computer 240 can also be carried out. To share files stored on the master computer 238, one or more shared directories are set up on the master computer 238 with appropriate access right settings for the user of the remote computer 240. The user of the remote computer 240 can then open the shared directories and access the files therein. Alternatively, shared directories can also be set up on the remote computer 240 with appropriate access right settings for the user of the master computer 238 and/or for users of other remote computers 240. The user of the master computer 238 or other remote computer 240 can similarly open the shared directories and access the files therein. Further, the LinQLauncher.exe application can be configured to send

files directly to and from the master and other remote computers 238 and 240 respectively.

[0050] With the peer-to-peer wireless connection established between the master computer 238 and the remote computer 240, those skilled in the art will appreciate that the user of the remote computer 240 may also be allowed to access the Internet through the master computer 238. To enable Internet access, the master computer 238 must be connected to the Internet via a wired or wireless local area network, dial-up network or other suitable type of network. With Internet access granted by the master computer 238, Internet access requests initiated by the remote computer 240 are transmitted to the master computer 238 over the peer-to-peer wireless connection. The master computer 238 in response to received Internet access requests sends the received Internet access requests either directly to the Internet or indirectly to the Internet via a proxy server. Responses returned from the Internet that are received directly by the master computer 238 or indirectly by the master computer 238 from the proxy server are returned to the remote computer 240 over the peer-to-peer wireless connection.

[0051] Upon termination of the session between the remote computer 240 and the master computer 238, the plug-and-play device 236 can be unplugged from the remote computer 240 and removed. When the plug-and-play device 236 is disconnected from the remote computer 240, the remote computer 240 notifies the LinQLauncher.exe application (step 344). The LinQLauncher.exe application in turn stops the screen sharing, disconnects the peer-to-peer wireless connection with the master computer 238, terminates the execution of the LinQ software application, deletes the files in the temporary directory on the remote computer 240 that were copied from the storage 276, and then terminates the execution of itself (step 348). Those skilled in the art will appreciate that other clean up tasks, such as removing items in the system registry that were written by the LinQ software application when it was launched may also be performed upon the disconnection of the plug-and-play device 236 from the remote computer 240.

[0052] Although Figure 4 shows the master computer 238 communicating with a single remote computer 240 over a peer-to-peer wireless connection, those of skill in the art will appreciate that this is simply for ease of illustration and that the master computer 238 may communicate with a plurality of remote computers 240 over peer-to-peer wireless connections via respective plug-and-play interfaces 236. In situations where the master computer 238 is communicating with multiple remote computers 240 over peer-to-peer wireless connections, compressed screen display data transmitted by one remote computer 240 to the master computer 238 may also be shared by the master computer 238 with one or more other remote computers 240. In addition, if a remote computer 240 establishes a connection to the master computer 238 over a peer-to-peer wireless connection and a peer-to-peer wireless connection between the master computer 238 and another remote computer 240 already exists over which screen display data is being shared, the master computer 238 can automatically share the screen display data with the newly connected remote computer 240. Control commands initiated on the newly connected remote computer 240 that are sent to the master computer 238 may be sent to the remote computer that is sharing its screen display data to remotely manipulate its operation provided that remote computer has enabled remote control.

[0053] Although the remote computer 240 is described as loading the wireless transceiver driver at step 328 when the LinQLauncher.exe application is loaded from storage 276, if desired, the driver for the wireless transceiver 260 may be loaded at step 318 when the driver for the plug-and-play device 236 which is recognized as a mass storage device is being loaded.

[0054] Similar to the embodiment of Figure 3, if desired, the master computer 238 can be connected to an interactive input system 228 of one of the types described previously as shown in Figure 7. In this case, shared screen display data received by the master computer 238 can be presented on the touch surface 246 of the interactive input system 228 via a projection device 244 that is connected to the master computer 238 by a physical cable 248

allowing a user to interact with the shared screen display data through pointer contacts with the touch surface 246.

[0055] Those of skill in the art will appreciate that the physical form of the plug-and-play device 236 may be changed. For example, although the plug-and-play device 236 is shown as being connected to the remote computer 240 via cable segment 268, the plug-and-play device 236 alternatively may take the form of a dongle similar to a USB flash drive or the like that plugs directly into the remote computer 240.

[0056] In the above embodiment, rather than establishing a peer-to-peer wireless connection, alternatively, the LinQ software application may be configured to direct the remote computer 240 to use its wireless network card to establish a wireless connection between the remote computer 240 and the master computer 238 over existing network infrastructure.

[0057] Figure 8 illustrates yet another embodiment of a system or network 420 of operatively connected components. Similar to the embodiment of Figure 4, system 420 comprises a plug-and-play device 436, a master computer 438 and at least one remote computer 440. The plug-and-play device 436 is physically connected to both the remote computer 440 and the master computer 438. The plug-and-play device 436 enables bi-directional transmission of screen display and remote control data in real-time between the master computer 438 and remote computer 440 by automatically launching software stored on the plug-and-play device 436.

[0058] The master computer 438, similar to the previous embodiment, runs a mobile device manager application to accept and manage connections from the remote computer 440, provide bi-directional screen sharing functionality, allow remote control from the remote computer 440, and optionally, provide the remote computer 440 with Internet access.

[0059] The components of the plug-and-play device 436 are better illustrated in Figure 9. As can be seen, the plug-and-play device 436 comprises an interface 456 in the form of a USB interface to computing device adapter and an interface 464 also in the form of a USB interface to computing device

adapter. The interface 456 comprises a port (not shown) to receive a cable segment 460 that extends and connects to the master computer 438. The interface 464 also comprises a port (not shown) to receive a cable segment 468 that extends and connects to the remote computer 440. The plug-and-play device 436 also comprises a controller 472 in the form of a USB host-to-host controller, and a USB hub 478. The USB host-to-host controller 472 allows bi-direction screen data sharing in real-time between the remote computer 440 and the master computer 438. The interface 456 is in communication with the USB hub 478 and the interface 464 is in communication with the USB host-to-host controller 472. The USB hub 478 communicates with the USB host-to-host controller 472.

[0060] Also in communication with the USB hub 478 is storage 476, for example flash memory, solid-state memory or other suitable computer memory. The storage 476 is configured to store and automatically launch software applications thereon via an autorun feature that the operating system of the remote computer 440 supports. The storage 476 is configured to operate in accordance with a mass storage device that defines itself as a CD ROM. Similar to the previous embodiment, storage 476 stores the executable LinQLauncher.exe application.

[0061] The operation of the system 440 when a connection between the master computer 438 and the remote computer 440 via the plug-and-play device 436 is established will now be described with particular reference to Figure 10. When the plug-and-play device 436 is physically connected to the remote computer 440 via the cable segment 468 (step 501) and the connection of the plug-and-play device 436 is detected by the operating system of the remote computer 440, the remote computer 440 queries the plug-and-play device 436 to determine what functionality is provided by the plug-and-play device 436 (step 502). In response to this query, the plug-and-play device 436 determines that it supports the mass storage device and USB host-to-host controller and returns this functionality information to the remote computer 440.

[0062] The remote computer 440, upon receiving the functionality information from the plug-and-play device 436, determines that mass storage

device and USB host-to-host controller functionality for the plug-and-play device 436 is available (step 503). The remote computer 440 then loads at least the driver for the mass storage device recognized by its operating system and initializes the plug-and-play device 436 (step 504). The remote computer 440 then assigns the plug-and-play device 436 which is recognized as a mass storage device, the next available drive letter (step 505).

[0063] The remote computer 440, similar to the previous embodiments, is configured as the majority of computers are by default; that is, the remote computer 440 is configured to search the mass storage devices for a file name that will direct the remote computer 440 to automatically execute instructions contained therein upon connection to the mass storage device. In this embodiment, the remote computer 440 queries the plug-and-play device 436 for the autorun.inf file and upon receiving the autorun.inf file, loads and executes the instructions contained therein (step 506).

[0064] The autorun.inf file contains a pointer to the executable launcher application, LinQLauncher.exe stored in storage 476. Upon parsing the autorun.inf file, the remote computer 440 uses the pointer to load a LinQ software application from the storage 476 (step 507). The LinQLauncher.exe application directs the remote computer 440 to copy all necessary files of the LinQ software application from storage 476 to a temporary directory on the remote computer 440 and then start the LinQ software application (step 508). The LinQ software application is used for setting up and managing the connection on the remote computer 440, screen sharing and other communications between the remote computer 440 and the master computer 438.

[0065] In this embodiment, the mass storage device functionality of the plug-and-play device 436 is only exposed to the remote computer 440. The mobile device manager software application running on the master computer 438 detects the insertion of cable segment 460 and communicates with it through a pre-installed driver on the master computer 438.

[0066] Upon launch, the LinQ software application on the remote computer 440 finds the master computer 438 and establishes a USB host-to-

host data channel between the remote computer 440 and master computer 438 and automatically connects to the mobile device manager software application running on the master computer 438 (step 509). The mobile device manager software application running on the master computer 438 manages the connection on the master computer 438.

[0067] Once the remote computer 440 is connected to the master computer 438, the remote computer 440 may send a request to share the screen display data of the remote computer 440 with the master computer 438. If a request to share the screen display data is sent to the master computer 438 and accepted, the screen display data of the remote computer 440 is compressed, sent to the master computer 438 and displayed on the screen of the master computer 438. The master computer 438 passes input events, such as keyboard, mouse, trackball and/or pen-touch events, that it receives to the remote computer 440 thereby to remotely control the remote computer 440 (step 510). As mentioned previously, the advantage of compressing the screen display data of the remote computer 440 before sending it to the master computer 438 is that the amount of data required to be transmitted to the master computer 438 is reduced. This of course reduces the transmission bandwidth and latency required for screen sharing.

[0068] If at the time the remote computer 440 is connected to the master computer 438 and another remote computer 440 in the network is sharing its screen display data with the master computer 438, the remote computer 440 automatically receives the compressed screen display data from the master computer 438, decompresses it and displays it on its display screen. Also, control commands initiated on the other remote computer 440 may be sent to the master computer 438 and then to the remote computer 440 to enable operation of the remote computer 440 to be remotely controlled provided the remote computer has enabled remote control.

[0069] If desired, the remote computer 440 can be configured to display the master computer desktop image on its display screen and pass input events, such as keyboard, mouse, trackball and/or pen-touch events that it

receives to the master computer 438 to remotely control the master computer 438 provided the master computer has enabled remote control.

[0070] When the connection is established between the master computer 438 and the remote computer 440, those skilled in the art will appreciate that, besides sharing the screen display data of the remote computer 440, file sharing between the master computer 438 and the remote computer 440 can also be carried out. To share files stored on the master computer 438, one or more shared directories are set up on the master computer 438 with appropriate user access right settings for the user of the remote computer 440. The user of the remote computer 440 can then open the shared directories and access the files therein. Alternatively, shared directories can also be set up on the remote computer 440 with appropriate access right settings for the user of the master computer 438 and/or for users of other remote computers 440.

[0071] With the connection established between the master computer 438 and the remote computer 440, those skilled in the art will appreciate that the user of the remote computer 440 may also be allowed to access Internet through the master computer 438. To enable the Internet access, the master computer 438 must be connected to the Internet via a wired or wireless local area network, dial-up network or any other type of network. With the allowance of Internet access granted by the user of the master computer 438, Internet access requests initiated by the remote computer 440 are transferred to the master computer 438. Responses returned from the Internet that are received directly by the master computer 438 or indirectly by the master computer 438 from the proxy server are returned to the remote computer 440.

[0072] Upon termination of the session between the remote computer 440 and the master computer 438, the plug-and-play device 436 can be unplugged from the remote computer 440 and removed. When the plug-and-play device 436 is disconnected from the remote computer 440, the remote computer 440 notifies the LinQLauncher.exe application (step 511). The LinQLauncher.exe application in turn stops the screen sharing, disconnects the connection with the master computer 438, terminates the execution of the LinQ

software application, deletes the files in the temporary directory on the remote computer 440 that were copied from the storage 476, and then terminates the execution of itself (step 512). Those skilled in the art will appreciate that other clean up tasks, for example removing items in the system registry that were written by the LinQ software application when it was launched, may be performed upon the disconnection of the plug-and-play device 436 from the remote computer 440.

[0073] In an alternative embodiment, the mass storage device functionality of the plug-and-play device 36 is exposed to both the master and remote computers 438 and 440 so that the LinQ software application is automatically launched on both the master and remote computers 438 and 440 respectively. Because the mobile device manager software application is running on the master computer 438, the LinQ software application launched on the master computer 438 closes itself so the mobile device manager software can communicate with the USB host-to-host controller 472. Upon launch of the LinQ software application on the remote computer 440, the LinQ software application finds the master computer 438 and establishes the USB host-to-host data channel and automatically connects to the mobile device manager software application running on the master computer 438 (step 309). The mobile device manager software application running on the master computer 438 manages the connection on the master computer 438.

[0074] Similar to the previous embodiments, if desired, the master computer 438 can be connected to an interactive input system 228 of one of the types described previously as shown in Figure 11. In this case, shared screen display data received by the master computer 438 can be presented on the touch surface 246 of the interactive input system 228 via a projection device 244 that is connected to the master computer 438 by a physical cable 248 allowing a user to interact with the shared screen display data through pointer contacts with the touch surface 246.

[0075] In the embodiments described above, the computers are described as using the autorun.inf file to perform auto-execution. Those of skill

in the art will appreciate that other auto-execution methods such as for example Autoplay may be employed.

[0076] In the embodiments where the plug-and-play devices use cable segments to connect to the remote computers and master computers, if desired, the cable segments may be retractably accommodated by the plug-and-play devices.

[0077] In the embodiments of Figures 4 to 11, rather than carrying out Internet connections over the connections between the remote computers and master computers, if desired, the remote computers may be directed to use their wireless network cards to establish an Internet connection over existing network infrastructure.

[0078] While the systems have 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 systems described herein for use with FireWire and PCMCIA architectures and the like.

[0079] While embodiments have 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, mice, keyboards, printers, displays, etc. For example, where the plug-and-play device is a sound system, the settings can include the output volumes for each speaker that has been previously calibrated to desired levels for the set configuration.

[0080] While an LCD projector has been described as projecting image data on the touch panel, those of skill in the art will appreciate that other devices such as with an LCD displays, plasma displays, cathode ray tubes, or other display devices known to those of skill in the art may be used to generate images that are presented on the touch panel.

[0081] Although embodiments have 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 comprising:

a first plug-and-play interface for establishing a connection with a first computing device;

a second plug-and-play interface for establishing a connection with a second computing device;

storage storing code that is automatically executed by the second computing device when said plug-and-play device is connected to said second computing device via said second plug-and-play interface, said code when executed by said second computing device initiating a screen display data exchange between said first and second computing devices through said plug-and-play device; and

at least one controller controlling said first plug-and-play interface, said second plug-and-play interface and said storage.

2. The plug-and-play device of claim 1 wherein the first plug-and-play interface comprises a wireless transceiver and wherein the first plug-and-play interface establishes a wireless connection with said first computing device.

3. The plug-and-play device of claim 2 wherein said wireless connection is a secure wireless connection.

4. The plug-and-play devive of claim 3 wherein said storage further stores at least one of at least one key, at least one biometric and at least one code used to establish said secure wireless connection.

5. The plug-and-play device of claim 2 wherein the second plug-and-play interface receives a physical connection extending to said second computing device.

6. The plug-and-play device of claim 5 wherein said physical connection is a universal serial bus (USB) cable.

7. The plug-and-play device of claim 2 further comprising a physical connection to said second computing device.

8. The plug-and-play device of claim 7 wherein said physical connection is a USB cable.

9. The plug-and-play device of claim 7 wherein said wireless connection is a secure wireless connection.

10. The plug-and-play device of claim 2 wherein the plug-and-play device is configured as a dongle to plug into a port of said second computing device.

11. The plug-and-play device of claim 10 wherein said wireless connection is a secure wireless connection.

12. The plug-and-play device of claim 2 wherein the storage is non-volatile memory.

13. The plug-and-play device of claim 2 wherein the at least one controller is a USB hub.

14. The plug-and-play device of claim 13 further comprising a physical connection to said second computing device.

15. The plug-and-play device of claim 14 wherein said wireless connection is a secure wireless connection.

16. The plug-and-play device of claim 13 wherein the plug-and-play device is configured as a dongle to plug into a port of said second computing device.

17. The plug-and-play device of claim 16 wherein said wireless connection is a secure wireless connection.

18. The plug-and-play device of claim 1 wherein said screen display data exchange comprises transmission of second computing device display screen data to said first computing device.

19. The plug-and-play device of claim 18 wherein the second computing device display screen data is compressed prior to transmission to said first computing device.

20. The plug-and-play device of claim 19 wherein differences between previously transmitted second computing device display screen data and current second computing device display screen data are transmitted.

21. The plug-and-play device of claim 1 wherein said screen display data exchange comprises transmission of first computing device display screen data to said second computing device.

22. The plug-and-play device of claim 21 wherein the first computing device display screen data is compressed prior to transmission to said second computing device.

23. The plug-and-play device of claim 24 wherein differences between previously transmitted first computing device display screen data and current first computing device display screen data are transmitted.

24. The plug-and-play device of claim 18 wherein the code when executed further permits file sharing between said first and second computing devices through said plug-and-play device.

25. The plug-and-play device of claim 21 wherein the code when executed further permits file sharing between said first and second computing devices through said plug-and-play device.

26. The plug-and-play device of claim 2 wherein said screen display data exchange comprises transmission of second computing device display screen data to said first computing device.

27. The plug-and-play device of claim 26 wherein the second computing device display screen data is compressed prior to transmission to said first computing device.

28. The plug-and-play device of claim 27 wherein differences between previously transmitted second computing device display screen data and current second computing device display screen data are transmitted.

29. The plug-and-play device of claim 2 wherein said screen display data exchange comprises transmission of first computing device display screen data to said second computing device.

30. The plug-and-play device of claim 29 wherein the first computing device display screen data is compressed prior to transmission to said second computing device.

31. The plug-and-play device of claim 30 wherein differences between previously transmitted first computing device display screen data and current first computing device display screen data are transmitted.

32. The plug-and-play device of claim 7 wherein said screen display data exchange comprises transmission of second computing device display screen data to said first computing device.

33. The plug-and-play device of claim 32 wherein compresses the second computing device display screen data is compressed prior to transmission to said first computing device.

34. The plug-and-play device of claim 33 wherein differences between previously transmitted second computing device display screen data and current second computing device display screen data are transmitted.

35. The plug-and-play device of claim 7 wherein said screen display data exchange comprises transmission of first computing device display screen data to said second computing device.

36. The plug-and-play device of claim 35 wherein the first computing device display screen data is compressed prior to transmission to said second computing device.

37. The plug-and-play device of claim 38 wherein differences between previously transmitted first computing device display screen data and current first computing device display screen data are transmitted.

38. The plug-and-play device of claim 1 wherein the first plug-and-play interface receives a physical connection extending to said first computing device and wherein the second plug-and-play interface receives a physical connection extending to the second computing device.

39. The plug-and-play device of claim 38 wherein each physical connection is a USB cable.

40. The plug-and-play device of claim 1 further comprising a physical connection to said first computing device and a physical connection to said second computing device.

41. The plug-and-play device of claim 40 wherein each physical connection is a USB cable.

42. The plug-and-play device of claim 40 wherein said screen display data exchange comprises transmission of second computing device display screen data to said first computing device.

43. The plug-and-play device of claim 42 wherein the second computing device display screen data is compressed prior to transmission to said first computing device.

44. The plug-and-play device of claim 43 wherein differences between previously transmitted second computing device display screen data and current second computing device display screen data are transmitted.

45. The plug-and-play device of claim 40 wherein said screen display data exchange comprises transmission of first computing device display screen data to said second computing device.

46. The plug-and-play device of claim 45 wherein the first computing device display screen data is compressed prior to transmission to said second computing device.

47. The plug-and-play device of claim 46 wherein differences between previously transmitted first computing device display screen data and current first computing device display screen data are transmitted.

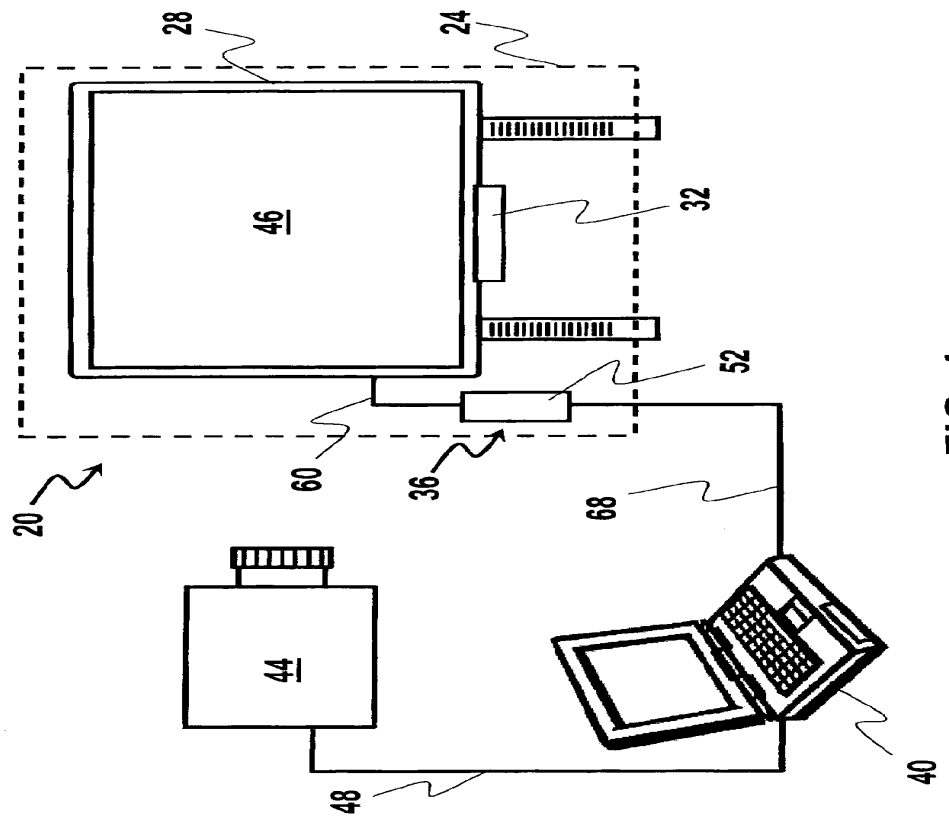


FIG. 1

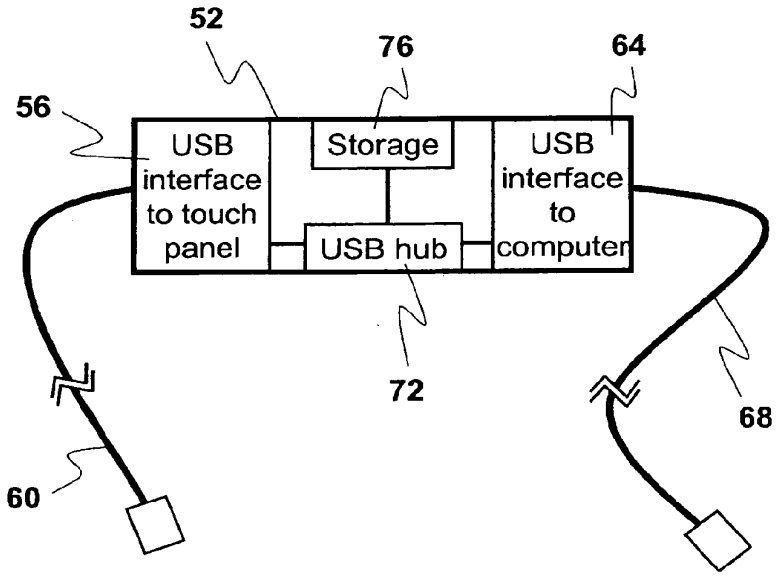

52
76
64
56
USB interface to touch panel
Storage
USB hub
USB interface to computer
72
68
60

FIG. 2

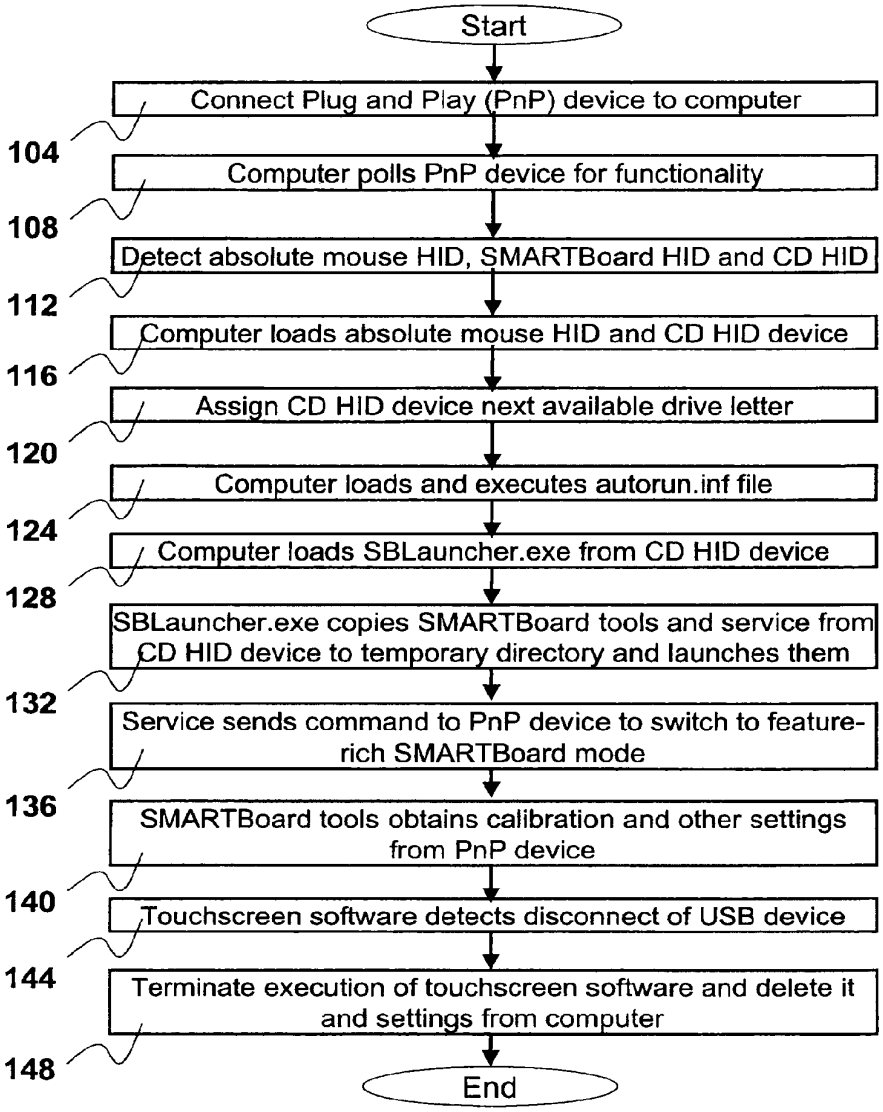

Start
Connect Plug and Play (PnP) device to computer
104
Computer polls PnP device for functionality
108
Detect absolute mouse HID, SMARTBoard HID and CD HID
112
Computer loads absolute mouse HID and CD HID device
116
Assign CD HID device next available drive letter
120
Computer loads and executes autorun.inf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

FIG. 3

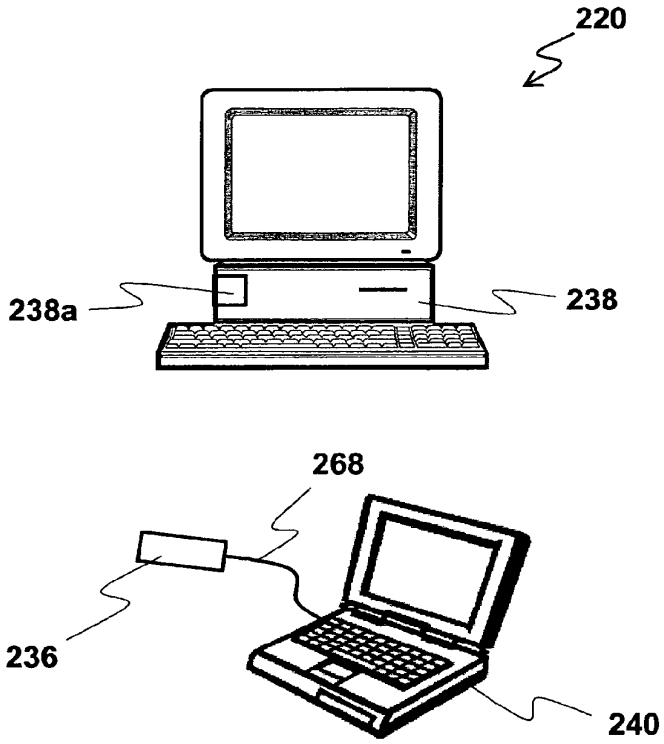


FIG. 4

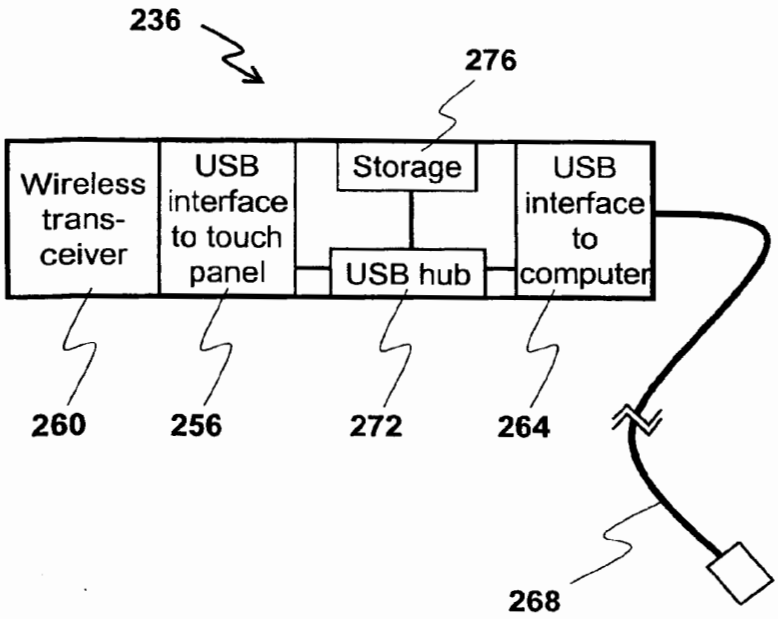

236
276
Wireless trans-ceiver
USB interface to touch panel
Storage
USB hub
USB interface to computer
260
256
272
264
268

FIG. 5

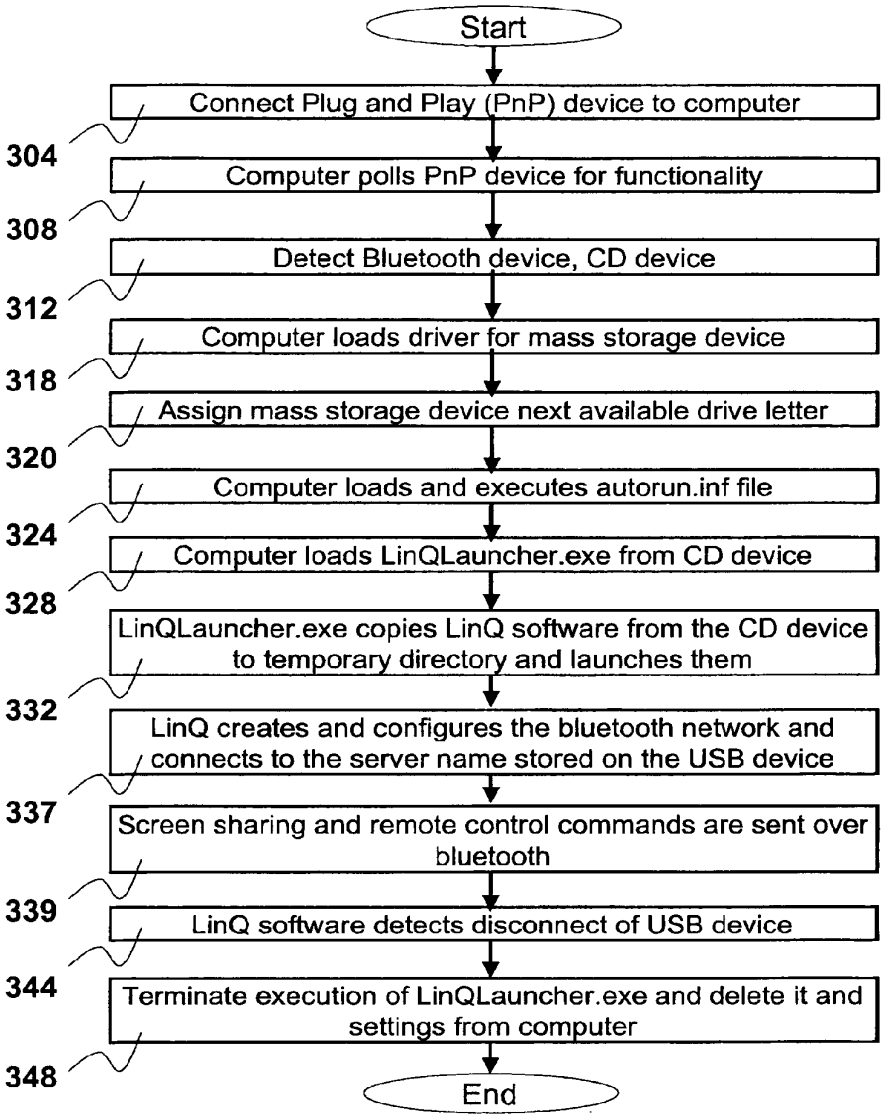

Start
Connect Plug and Play (PnP) device to computer
304
Computer polls PnP device for functionality
308
Detect Bluetooth device, CD device
312
Computer loads driver for mass storage device
318
Assign mass storage device next available drive letter
320
Computer loads and executes autorun.inf file
324
Computer loads LinQLauncher.exe from CD device
328
LinQLauncher.exe copies LinQ software from the CD device to temporary directory and launches them
332
LinQ creates and configures the bluetooth network and connects to the server name stored on the USB device
337
Screen sharing and remote control commands are sent over bluetooth
339
LinQ software detects disconnect of USB device
344
Terminate execution of LinQLauncher.exe and delete it and settings from computer
348
End

FIG. 6

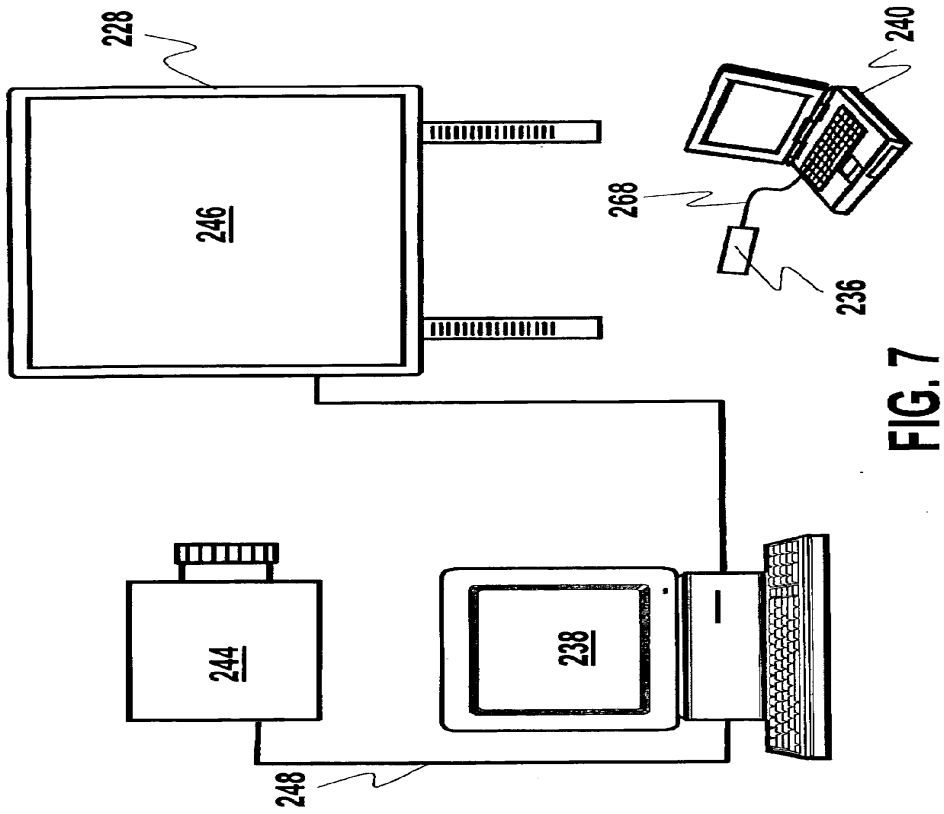


FIG. 7

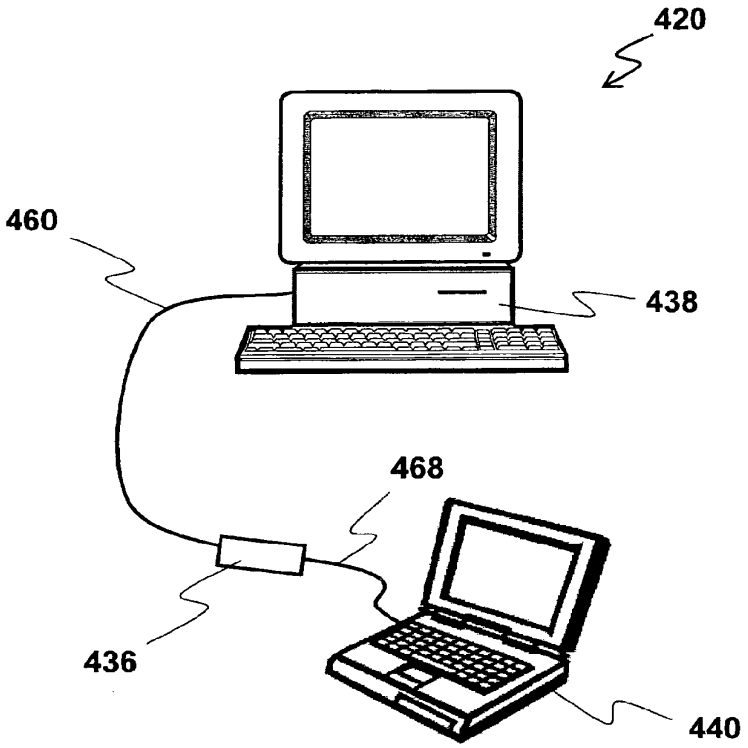


FIG. 8

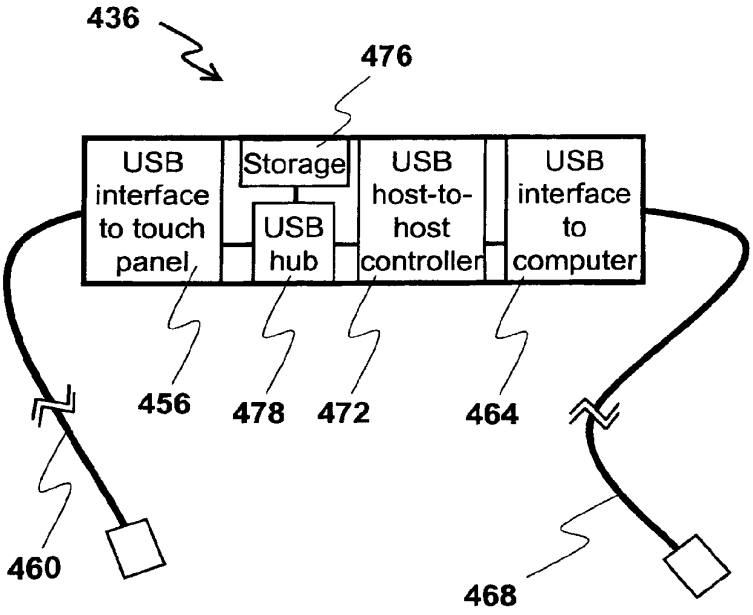

436
476
USB interface to touch panel
Storage
USB hub
USB host-to-host controller
USB interface to computer
456
478
472
464
460
468

FIG. 9

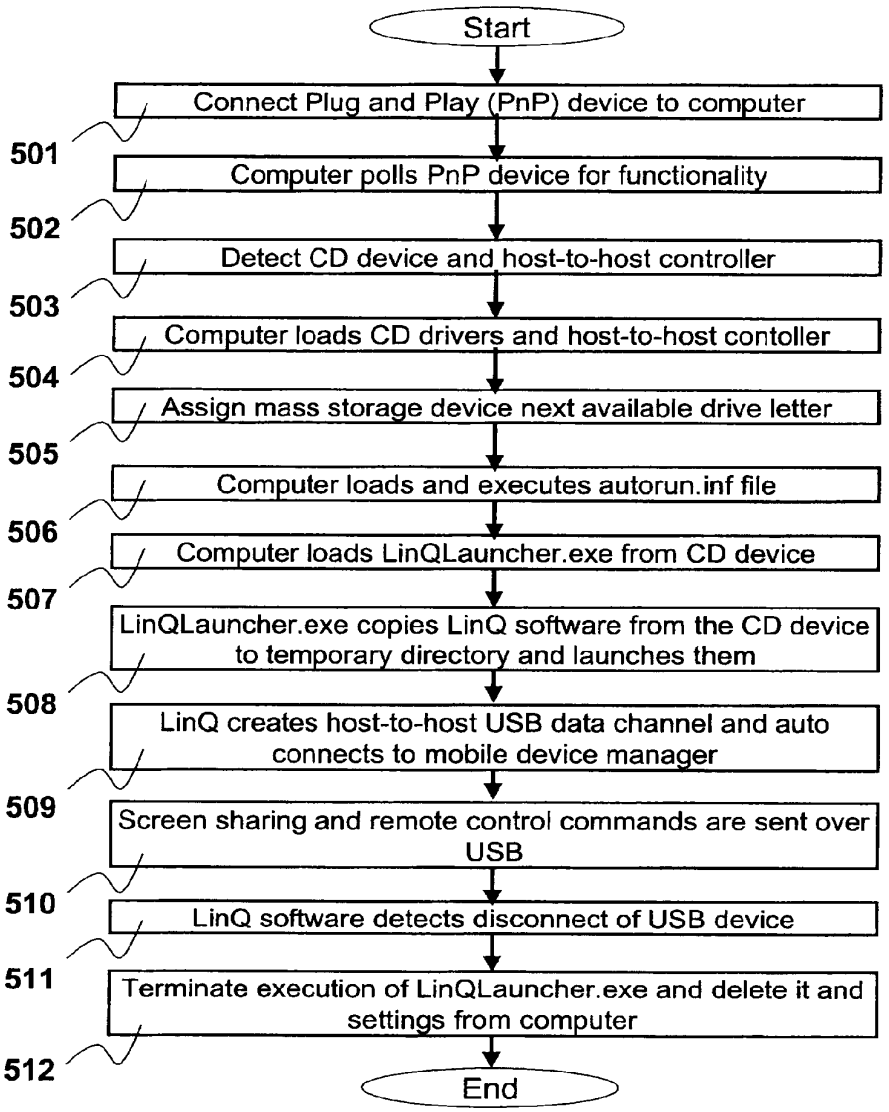

Start
Connect Plug and Play (PnP) device to computer
501
Computer polls PnP device for functionality
502
Detect CD device and host-to-host controller
503
Computer loads CD drivers and host-to-host contoller
504
Assign mass storage device next available drive letter
505
Computer loads and executes autorun.inf file
506
Computer loads LinQLauncher.exe from CD device
507
LinQLauncher.exe copies LinQ software from the CD device to temporary directory and launches them
508
LinQ creates host-to-host USB data channel and auto connects to mobile device manager
509
Screen sharing and remote control commands are sent over USB
510
LinQ software detects disconnect of USB device
511
Terminate execution of LinQLauncher.exe and delete it and settings from computer
512
End

FIG. 10

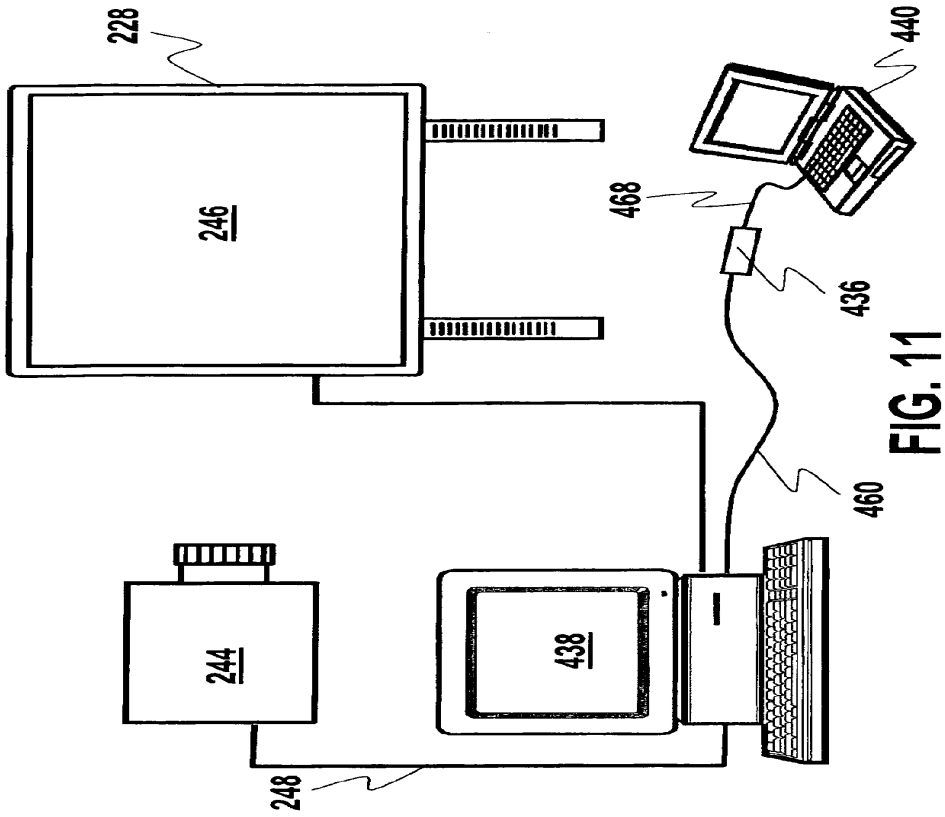


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2010/000185

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***G06F 3/00*** (2006.01) , ***G06F 13/38*** (2006.01) , ***H04W 12/02*** (2009.01)
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)
IPC: ***ALL*** (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Delphion & keywords:
silent/auto-/self- installation/execution/configuration/download/launch;
plug-and-play/PnP/"Universal Plug-and-Play"/UPnP/USB/Firewire/PCMCIA adapter/connecting/device;
screen/display/video/image/visual data/information/content;
exchange/transfer/send/share/transmit/swap/communicate/interchange/channel;
download "device driver"/"peripheral driver"/code/software/program;
two-way/"two way"/bi-directional/bidirectional/dual/send&receive

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2009/0069049 A1 (*Jain*) - 12 March 2009 (12-03-2009) * abstract; [0018]; [0025]; [0037]; [0040]; [0045]; [0052]-[0053]; [0056]; [0068]; Fig. 1 *	1-12, 18-47 13-17
Y	US 2005/0278461 A1 (*Otha et al.*) - 15 December 2005 (15-12-2005) * abstract; [0004]; [0010]-[0011]; [0032]-[0033]; [0042]-[0043] *	13-17
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A	US 2005/0038934 A1 (*Gotze et al.*) - 17 February 2005 (17-02-2005)	

[ ] 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
"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
"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
12 April 2010 (12-04-2010)	21 April 2010 (21-04-2010)
Name and mailing address of the ISA/CA 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	Authorized officer Cristian S. Popa (819) 997-2299

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2010/000185

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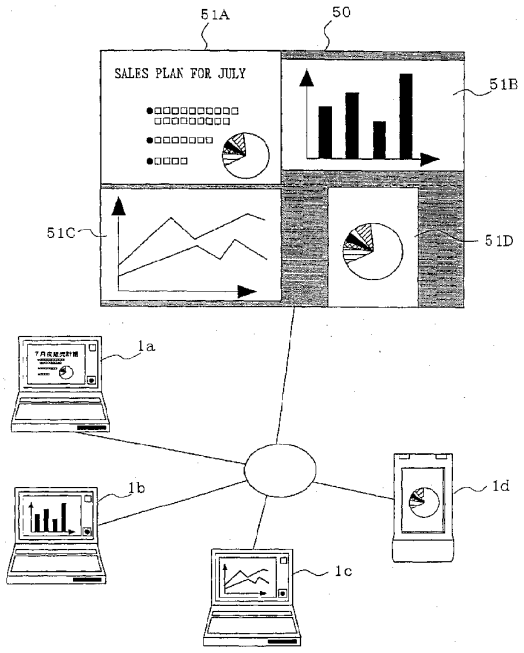
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(54) Display system, network interactive display device, terminal, and control program

(57) A technique for presenting display screens of a plurality terminals (1a - 1d) connected to a network (3) on a multi-window screen of a display screen of a display device (2). A communication unit (28) receives image data captured and then sent by each terminal having a screen capture function. A display control unit (22) controls an image synthesizer (42) to synthesize the captured image data into single screen multi-window format data. A multi-window screen is thus presented.

FIG. 8



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a technique that presents screens of a plurality terminals connected to a network on a single screen of a display device in a multi-window presentation fashion.

2. Description of the Related Art

[0002] FIG. 25 shows a structure of a conventional display system. Connected to a network 210 as shown are a projector 220, a notebook computer 230, and desk-top computers 251, 252, 253, and 254 as network interactive display devices. Further connected to the network 210 are tablets 261, 262, 263, and 264, each of which directly inputs drawings to the projector 220 and inserts data in the already projected drawings. A screen capture software program is already installed on each of the notebook computer 230 and the desk-top computers 251, 252, 253, and 254.

[0003] In the conventional display system thus constructed, the screen capture software program captures the content displayed on the screen of the notebook computer 230, and the captured image data is then sent to the projector 220 through the network 210. The screen presented on the notebook computer 230 is thus projected and displayed on the projector 220. Operating a remote controller as an attachment to the projector 220, the projected image on the projector 220 is switched from a screen of the notebook computer 230 to a screen of the desk-top computer 251, for example.

[0004] The image presented on the projector 220 in the conventional display system is one of the computer screen images of the notebook computer 230, and the desk-top computers 251, 252, 253, and 254. To compare the contents of one screen to another of the notebook computer 230 and the desk-top computers 251, 252, 253, and 254, the user is forced to switch the screens from one to another. There is a growing need for a function that allows screens of a plurality of personal computers on a single screen of a display device.

[0005] To satisfy such a need, development efforts have been made. However, no such a display system satisfying the need exist. For one reason, a large throughput is required of a projector (a network interactive display device) in a display system, and a workload on a network also increases.

SUMMARY OF THE INVENTION

[0006] Accordingly, it is an object of the present invention to provide a network interactive display device and a display control program for presenting display screens of a plurality of terminals, connected to a network, on a screen of a display of the display device in a multi-window presentation fashion.

[0007] It is also another object of the present invention to provide a display system, a network interactive display device, a display control software program, a network interactive projector, a network interactive plasma display apparatus, a network interactive liquid-crystal display apparatus, a terminal, and a control software program, each for presenting display screens of a plurality of terminals, connected to a network, on a screen of a display of the network interactive display device in a multi-window presentation fashion without introducing an increase in workload on the network interactive display device and the network.

[0008] A display system in one aspect of the present invention includes a plurality of terminals, each terminal having a screen capture function, and sending image data, captured using the screen capture function, over a network, and a network interactive display device, including a display, and receiving the captured image data transmitted from the terminal through the network, and having a multi-window screen presentation function for synthesizing the captured image data into single screen multi-window format data to be displayed on a display screen of the display, wherein, as processes required to present the single screen multi-window format data on the display screen of the display of the network interactive display device, the terminal performs a size conversion process of an image size of the image data captured using the screen capture function and the network interactive display device acquires the captured image data subsequent to the size conversion thereof from the terminal, and synthesizes the received captured image data.

[0009] The size conversion process for a multi-window screen presentation function is performed on the terminal. The display system presents the screens of the plurality terminals connected to the network on the display of the network interactive display device in a multi-window format without introducing an increase in workload on the network interactive display device and the network.

[0010] In the display system of a preferred embodiment of the present invention, the network interactive display device may divide the display screen of the display into windows of the number equal to the number of terminals to be displayed, may determine a display size of the window assigned to each terminal to be displayed, and may send information of the display size to the terminal, and the terminal may perform the size conversion on the image size of the captured image data to the received display size when the terminal receives the display size.

[0011] In accordance with the preferred embodiment of the present invention, the terminal performs the size conversion process based on the display size determined by the network interactive display device.

[0012] In the display system of a preferred embodi-

ment of the present invention, the terminal may further perform a color conversion process on the captured image data in accordance with a color count of the display of the network interactive display device before sending the captured image data to the network interactive display device, in addition to the size conversion process on the image data captured using the screen capture function.

[0013] In the preferred embodiment of the present invention, the workload on the network interactive display device is further reduced because the terminal performs the color conversion process before sending the captured image data to the network interactive display device.

[0014] In the display system of a preferred embodiment of the present invention, the network interactive display device may also send the color count of own display to the terminal when sending the display size to the terminal, while the terminal may perform the color conversion process in response to the color count received from the network interactive display device.

[0015] In accordance with the preferred embodiment of the present invention, the terminal performs the color conversion process in response to the color count designated by and received from the network interactive display device.

[0016] In the display system of a preferred embodiment of the present invention, the network interactive display device may include a projector.

[0017] In accordance with the preferred embodiment of the present invention, the network interactive display device is the projector.

[0018] In the display system of a preferred embodiment of the present invention, the network interactive display device may include a plasma display.

[0019] In accordance with the preferred embodiment, a plasma display is used as the network interactive display device.

[0020] In the display system of a preferred embodiment of the present invention, the network interactive display device may include a liquid-crystal monitor.

[0021] In accordance with the preferred embodiment, a liquid-crystal monitor is used as the network interactive display device.

[0022] In the display system of a preferred embodiment of the present invention, the network interactive display device may include an organic EL display.

[0023] In accordance with the preferred embodiment, an organic EL (Electroluminescent) display is used as the network interactive display device.

[0024] In the display system of a preferred embodiment of the present invention, the terminal may include one of a personal computer and a PDA (Personal Digital Assistant).

[0025] In accordance with the preferred embodiment of the present invention, one of a personal computer and a PDA is used as the terminal.

[0026] A network interactive display device in another aspect of the present invention is connected to a plurality of terminals through a network, each terminal having a screen capture function, and includes a display, a communication unit for communicating in a two-way fashion with each of the terminals, and a display control unit, wherein the communication unit receives the image data which has been captured by each terminal through the screen capture function thereof, and which has been size converted to a predetermined image size by each terminal, and the display control unit has a multi-window screen presentation function for synthesizing the captured image data received by the communication unit into single screen multi-window format data to be displayed on a display screen of the display.

[0027] Since the network interactive display device receives the captured image data in the size converted form thereof from the terminal, and synthesizes the received image data, the workload of processing in the multi-window presentation is reduced in the network interactive display device.

[0028] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an insertion function for inserting a new window into a current display screen to display the new window.

[0029] In accordance with the preferred embodiment, the network interactive display device has the insertion function.

[0030] In the network interactive display device of a preferred embodiment of the present invention, the user may select at will a terminal, which provides the captured image data to be displayed on the display screen of the display, from among the plurality of terminals connected to the network interactive display device.

[0031] In accordance with the preferred embodiment, the network interactive display device allows the user to select at will a terminal, which is to provide the captured image data to be displayed on the display screen of the display, from among the plurality of terminals connected to the network interactive display device.

[0032] In the network interactive display device of a preferred embodiment of the present invention, the terminal that provides the captured image data to be displayed on the display screen of the display may be selected in a two-way communication of the communication unit by one of the network interactive display device and the terminals.

[0033] In accordance with the preferred embodiment, the network interactive display device allows the terminal displaying the captured image data on the display screen to be selected in a two-way communication of the communication unit by one of the network interactive display device and the terminal.

[0034] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an expansion display function for expanding a predetermined window from among a plurality of windows forming a multi-window screen dis-

played on the display screen of the display.

[0035] In accordance with the preferred embodiment, the network interactive display device has the expansion display function for expanding the predetermined window.

[0036] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have a single-window screen selection function for switching the display screen from a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen to a single-window full screen.

[0037] In accordance with the preferred embodiment, the network interactive display device has the single-window screen selection function for switching the display screen from the predetermined window to the single-window full screen.

[0038] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an erase function for erasing a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

[0039] In accordance with the preferred embodiment, the network interactive display device has the erase function for erasing the predetermined window.

[0040] In the network interactive display device of a preferred embodiment of the present invention, the predetermined window may be selected in response to an operation by the user.

[0041] In accordance with preferred embodiments, the network interactive display device allows the user to select the window to be expanded, the window to be switched to the single-window full screen, and the window to be erased.

[0042] In the network interactive display device of a preferred embodiment of the present invention, the predetermined window may be selected by one of the network interactive display device and the terminal in a two-way communication of the communication unit thereof.

[0043] In the preferred embodiment, the window to be expanded, the window to be switched to the single-window full screen, or the window to be erased is designated by one of the network interactive display device or the terminal.

[0044] In the network interactive display device of a preferred embodiment of the present invention, the image captured data received from the terminal may be obtained by designating the whole or a portion of the display screen of the terminal.

[0045] In accordance with the preferred embodiment, the network interactive display device displays the captured image data, which is obtained using full-screen capturing or partial-screen capturing.

[0046] In the network interactive display device of a preferred embodiment of the present invention, the captured image data received from the terminal may be obtained by detecting and capturing only a change on the display screen of the terminal.

[0047] In accordance with the preferred embodiment, the workload on the network is reduced by capturing only the change on the screen of the terminal. The network interactive display device thus presents image data which is a combination of existing captured data and the changed component of data.

[0048] In a preferred embodiment of the present invention, the network interactive display device may include a display size determining unit that divides the display screen of the display into windows of the number equal to the number of terminals to be displayed, and determines a display size of the window to which the terminal to be displayed is assigned, and a controller that sends the display size determined by the display size determining unit to the corresponding terminal through the communication unit, wherein the controller receives, through the communication unit, the captured image data, having the converted size equal to the display size of the window assigned to the terminal, from the terminal to which the display size is sent, and controls the display control unit to synthesize the received captured image data into single screen multi-window format data to be displayed on the display screen of the display.

[0049] In accordance with the preferred embodiment, the display size converted by the terminal is set to be display size determined by the display size determining unit.

[0050] In the network interactive display device of a preferred embodiment of the present invention, an aspect ratio of the window assigned to the terminal to be displayed may be equalized to an aspect ratio of the display screen of the display of the terminal.

[0051] In accordance with the preferred embodiments of the present invention, the network interactive display device provides a display screen free from discordance.

[0052] In the network interactive display device of a preferred embodiment of the present invention, through the communication unit, the controller may also send a display color count of the display to the terminal when sending the display size to the terminal, may receive the captured image data having the converted size equal to the display size of the window assigned to the terminal and having the display color count converted to the display color count of the display of the network interactive display device, from the terminal to which the display size and the display color count have been sent, and may control the display control unit to synthesize the received captured image data into single screen multi-window format data to be displayed on the display screen of the display.

[0053] In accordance with the preferred embodiment, the network interactive display device receives, from the terminal, the captured image data the terminal has color converted in addition to the size conversion process for contraction and synthesizes the received image data. The workload of processing in the multi-window presen-

tation is reduced in the network interactive display device.

[0054] In the network interactive display device of a preferred embodiment of the present invention, a communication protocol of the communication unit may include the TCP/IP protocol.

[0055] In accordance with the preferred embodiment, the widely used TCP/IP is used as the communication protocol of the communication unit.

[0056] In the network interactive display device of a preferred embodiment of the present invention, the network may include one of a LAN, a radio LAN, and a near-field communication radio LAN.

[0057] In accordance with the preferred embodiment, one of the LAN (Local-Area Network), the radio LAN, the near-field communication radio LAN is used as the network.

[0058] A network interactive projector in yet another aspect of the present invention includes one of the above-referenced network interactive display devices.

[0059] In accordance with the above aspect, the projector has the above-referenced advantages of the network interactive display device.

[0060] In the network interactive projector of a preferred embodiment of the present invention, the display may include one of a liquid-crystal light valve, an LCoS light valve, and a DMD (Digital Micromirror Device) (Trademark of Texas Instruments).

[0061] In accordance with the preferred embodiment, the projector including one of the liquid-crystal light valve, the LCoS light valve, and the DMD has the above-referenced advantages of the network interactive display device.

[0062] A network interactive plasma display apparatus in yet another aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes a plasma display panel.

[0063] In accordance with the above aspect of the present invention, the plasma display apparatus provides the above-referenced advantages of the network interactive display device.

[0064] A network interactive liquid-crystal display apparatus in yet another aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes a liquid-crystal panel.

[0065] In accordance with the above aspect of the present invention, the liquid-crystal display apparatus have the above-referenced embodiments of the network interactive display device.

[0066] A network interactive organic EL display apparatus in a further aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes an organic EL panel.

[0067] In accordance with the above aspect of the present invention, the network interactive organic EL display apparatus provides the above-referenced advantages of the network interactive display device.

[0068] The present invention in a further aspect relates to a display control software program of a CPU that constitutes the display control unit of one of the above-referenced network interactive display devices.

[0069] In accordance with the above aspect of the present invention, the display control program allows a display device to provides the above-referenced advantages of the network interactive display device.

[0070] In yet another aspect of the present invention, a terminal, connected to one of the above-referenced network interactive display devices includes a display, a communication unit that communicates in a two-way fashion with the network interactive display device, a screen capture processor that captures the content displayed on the display screen of the display, an image converter which converts the image data captured by the screen capture processor to image data having a predetermined image size, and a controller that sends the captured image data, size converted by the image converter, from the communication unit to the network interactive display device, wherein the terminal generates the captured image data that is to be displayed on one of the multi windows displayed on the display screen of the network interactive display device.

[0071] When the captured image data to be displayed on one of the windows of the screen of the network interactive display device is generated, a part of the process required for the multi-window presentation, i.e., the size conversion process is performed by the terminal. The terminal thus contributes to a reduction in the workload on the network interactive display device.

[0072] In the terminal of a preferred embodiment of the present invention, the display screen of the display of the network interactive display device may be divided into windows of the number equal to the number of terminals to be displayed, a display size of the window assigned to each terminal to be displayed is determined, and the image converter converts the image data captured by the screen capture processor to image data having the display size assigned to own terminal.

[0073] In accordance with the preferred embodiment, the size conversion process is carried out based on the display size determined by the network interactive display device.

[0074] In the terminal of a preferred embodiment of the present invention, the image converter may perform a color conversion on the captured image data to match the display color count of the display of the network interactive display device in addition to the size conversion process, and the controller may send the captured image data, which has been subjected to the size conversion process and the color conversion process, from the communication unit to the network interactive display device.

[0075] In accordance with the preferred embodiment, the image converter performs the color conversion on

the captured image data in addition to the size conversion process, thereby further reducing the workload on the network interactive display device.

[0076] The present invention in a further aspect relates to a control software program of a CPU that constitutes each processor of one of the above-referenced terminals.

[0077] In accordance with the above aspect, the control program allows a terminal to have the above-referenced advantages of the above terminal.

[0078] The present invention in a further aspect relates to a network interactive display device connected to each of a plurality of terminals through a network, each terminal having a screen capture function, and includes a display, a communication unit for communicating in a two-way fashion with each of the terminals, and a display control unit, wherein the display control unit has a multi-window screen presentation function for synthesizing the captured image data, captured by each terminal through the screen capture function and received by the communication unit, into single screen multi-window format data to be displayed on a display screen of the display.

[0079] The network interactive display device presents the screens of the plurality terminals connected to the network on the display screen of a display of the network interactive display device in a multi-window format.

[0080] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an insertion function for inserting a new window into a current display screen to display the new window.

[0081] In accordance with the preferred embodiment, the network interactive display device has the insertion function.

[0082] In the network interactive display device of a preferred embodiment of the present invention, the user may select at will a terminal, which provides the captured image data to be displayed on the display screen of the display, from among the plurality of terminals connected to the network interactive display device.

[0083] In accordance with the preferred embodiment, the network interactive display device allows the user to select at will a terminal, which is to provide the captured image data to be displayed on the display screen of the display, from among the plurality of terminals connected to the network interactive display device.

[0084] In the network interactive display device of a preferred embodiment of the present invention, the terminal that provides the captured image data to be displayed on the display screen of the display may be selected in a two-way communication of the communication unit by one of the network interactive display device and the terminal.

[0085] In accordance with the preferred embodiment, the network interactive display device allows the terminal providing the captured image data on the display screen to be selected in a two-way communication of the communication unit by one of the network interactive display device and the terminal.

[0086] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an expansion display function for expanding a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

[0087] In accordance with the preferred embodiment, the network interactive display device has the expansion display function for expanding the predetermined window.

[0088] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have a single-window screen selection function for switching the display screen from a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display to a single-window full screen.

[0089] In accordance with the preferred embodiment, the network interactive display device has the single-window screen selection function for switching the display screen from the predetermined window to the single-window full screen.

[0090] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may have an erase function for erasing a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

[0091] In accordance with the preferred embodiment, the network interactive display device has the erase function for erasing the predetermined window.

[0092] In the network interactive display device of a preferred embodiment of the present invention, the predetermined window may be selected in response to an operation by the user.

[0093] In accordance with preferred embodiments, the network interactive display device allows the user to select the window to be expanded, the window to be switched to the single-window full screen, and the window to be erased.

[0094] In the network interactive display device of a preferred embodiment of the present invention, the predetermined window may be selected by one of the network interactive display device and the terminal in a two-way communication of the communication unit thereof.

[0095] In the preferred embodiment, any of the window to be expanded, the window to be switched to the full-screen mode, or the window to be erased is designated by one of the network interactive display device and the terminal.

[0096] In the network interactive display device of a preferred embodiment of the present invention, the captured image data received from the terminal may be obtained by designating the whole or a portion of the dis-

play screen of the terminal.

[0097] In accordance with the preferred embodiment, the network interactive display device displays the captured image data, which is obtained using full-screen capturing or partial-screen capturing.

[0098] In the network interactive display device of a preferred embodiment of the present invention, the captured image data received from the terminal may be obtained by detecting and capturing only a change on the display screen of the terminal.

[0099] In accordance with the preferred embodiment, the workload on the network is reduced by capturing only the change on the screen of the terminal. The network interactive display device thus presents image data which is a combination of existing captured data and the changed component of data.

[0100] In the network interactive display device of a preferred embodiment of the present invention, the display control unit may include a window area information generator which divides the display screen of the display into windows of the number equal to the number of terminals to be displayed, and generates window area information containing a display size of the window to which the terminal to be displayed is assigned, and information identifying a display position of the window, an image synthesizer which synthesizes the captured image data from the terminals into single screen multi-window format data in accordance with the window area information generated by the window area information generator, thereby generating synthesized image data, and an image processor which processes the synthesized image data generated by the image synthesizer, thereby generating display image data and outputting the display image data to the display.

[0101] In the network interactive display device of a preferred embodiment of the present invention, the image synthesizer may synthesize the captured image data by contracting or expanding the captured image data from each terminal with an aspect ratio of the image size of the captured image data maintained.

[0102] In accordance with the preferred embodiment, the network interactive display device provides a display screen free from discordance.

[0103] In the network interactive display device of a preferred embodiment of the present invention, a communication protocol of the communication unit may include the TCP/IP protocol.

[0104] In accordance with the preferred embodiment, the widely used TCP/IP is used as the communication protocol of the communication unit.

[0105] In the network interactive display device of a preferred embodiment of the present invention, the network may include one of a LAN, a radio LAN, and a near-field communication radio LAN.

[0106] In accordance with the preferred embodiment, one of the LAN, the radio LAN, the near-field communication radio LAN is used as the network.

[0107] A network interactive projector in a further aspect of the present invention includes one of the above-referenced network interactive display devices.

[0108] In accordance with the above aspect of the present invention, the projector has the above-referenced advantages of the network interactive display device.

[0109] In the network interactive projector of a preferred embodiment of the present invention, the display may include one of a liquid-crystal light valve, an LCoS light valve, and a DMD.

[0110] In accordance with the preferred embodiment, the projector including one of the liquid-crystal light valve, the LCoS light valve, and the DMD has the above-referenced advantages of the network interactive display device.

[0111] A network interactive plasma display apparatus in a further aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes a plasma display panel.

[0112] In accordance with the above aspect, the plasma display apparatus have the above-referenced advantages of the network interactive display device.

[0113] A network interactive liquid-crystal display apparatus in a further aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes a liquid-crystal panel.

[0114] In accordance with the above aspect, the liquid-crystal display apparatus have the above-referenced embodiments of the network interactive display device.

[0115] A network interactive organic EL display apparatus in a further aspect of the present invention includes one of the above-referenced network interactive display devices, wherein the display includes an organic EL panel.

[0116] In accordance with the above aspect, the network interactive organic EL display apparatus provides the above-referenced advantages of the network interactive display device.

[0117] The present invention in a further aspect relates to a display control software program of a CPU that constitutes the display control unit of one of the above-referenced network interactive display devices.

[0118] In accordance with the above aspect, the display control program provides a display device with the above-referenced advantages of one of the above network interactive display devices.

BRIEF DESCRIPTION OF THE DRAWINGS

[0119]

FIG. 1 illustrates a network of a display system including a network interactive display device in accordance with preferred embodiments of the present invention;

FIG. 2 is a block diagram illustrating the structure of a terminal in accordance with a first preferred embodiment of the present invention;
FIG. 3 is a block diagram illustrating the structure of a network interactive display device of the first preferred embodiment;
FIG. 4 is a functional diagram illustrating the function of the network interactive display device of the first preferred embodiment;
FIG. 5 illustrates items of terminal information managed in a display status management file;
FIG. 6 is a flow diagram illustrating the operation of the first preferred embodiment;
FIG. 7 is a continuation of the flow diagram of FIG. 6;
FIG. 8 illustrates the configuration of the display system in which display screens of four terminals 1a-1d are presented on a display screen of a display device;
FIG. 9 is a flow diagram illustrating the flow of a window area information generation process;
FIG. 10 illustrates a specific structure of the display status management file;
FIG. 11A illustrates a specific structure of a table held in a tentative window area setting file, and FIG. 11B illustrates a tentative window area based on the table of FIG. 11A;
FIG. 12 illustrates a true window area size and a true origin;
FIG. 13 illustrates one example of a window area information file;
FIG. 14 is a flow diagram of an operation of the terminal which has received a capture start command and a display status management file from the display device of the first preferred embodiment;
FIG. 15 diagrammatically illustrates the display system to explain an expansion display function;
FIG. 16A illustrates a tentative window area setting table which is referenced when a priority order is updated, and FIG. 16B illustrates a tentative window area based on the table of FIG. 16A;
FIG. 17 illustrates a true window area with the priority order modified;
FIG. 18 illustrates a window area information file that is produced when the priority order is modified;
FIG. 19 diagrammatically illustrates a single-window screen presentation function;
FIG. 20 diagrammatically illustrates an insertion function;
FIG. 21 diagrammatically illustrates a window erase function;
FIG. 22 is a flow diagram illustrating an operation of terminal which has received a difference capture start command and a display status management file from the display device;
FIG. 23 illustrates a screen comparison process wherein a mouse pointer is moved;
FIG. 24 illustrates the screen comparison process of FIG. 23;
FIG. 25 illustrates a conventional display system;
FIG. 26 is a block diagram illustrating a structure of the terminal in accordance with a second preferred embodiment of the present invention;
FIG. 27 is a block diagram illustrating a structure of the network interactive display device of the second preferred embodiment;
FIG. 28 is a functional diagram of an operation of the network interactive display device of the second preferred embodiment of the present invention;
FIG. 29 is a flow diagram illustrating an operation of the display system of the second preferred embodiment of the present invention; and
FIG. 30 is a flow diagram illustrating the operation of the terminal which has received a capture start command and a display status management file from the display device of the second preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

First Embodiment

[0120] FIG. 1 illustrates a network of a display system 100 including a network interactive display device 2 in accordance with preferred embodiments of the present invention.

[0121] The display system 100 includes a plurality of terminals (only four terminals 1a, 1b 1c, and 1d are shown in FIG. 1), and the network interactive display device 2 (a projector here) having a multi-window screen presentation function as one of major functions of the present invention. The plurality of terminals 1 are respectively connected to the network interactive display device 2 (hereinafter simply referred to the display device 2) through a network 3 in a two-way communication based on the TCP/IP protocol. A unique name is provided beforehand to each terminal 1 (hereinafter referred to as a terminal name). The network 3 may be any of a LAN (Local Area Network), a radio LAN, and a near-field communication radio LAN such as Bluetooth (Tradename of Bluetooth SIG Inc., U.S.A.).

[0122] The display system 100 allows screens presented on the plurality of terminals 1 to be concurrently presented on a multi-window display screen of the display device 2. Such a system 100 is useful in a conference or a presentation. The terminal 1 and the display device 2 will now be discussed in detail.

[0123] FIG. 2 is a block diagram illustrating the structure of the terminal 1 in accordance with a first preferred embodiment of the present invention.

[0124] The terminal 1 may be a personal computer or a PDA (Personal Digital Assistant). The terminal 1 includes a display 11 for presenting a diversity of information such as materials for presentation, a video memory 12 for storing the content to be presented on the display 11, an input section 13 including of a tablet, a mouse,

or a keyboard, a user interface 14 for detecting an operational input entered from the input section 13 and outputting the operational input to a controller (CPU) 16, a storage 15 for storing application software programs (such as a control program) for performing the processes of the present invention and a variety of pieces of data, the controller 16, and a communication unit 17.

[0125] The control program stored in the storage 15 is used to perform a terminal control function to perform a multi-window screen presentation function on the network interactive display device 2, a screen capture function to capture a whole or a part of the screen of the display 11, an image conversion function to convert captured image data acquired using the screen capture function into data in a format of a display 21 of the network interactive display device 2, and a function to detect a change on the screen of the display 11. The application software programs and the CPU constitute a data management processor 18, a screen capture processor 19, an image converter 19A, and a screen comparison processor 20.

[0126] The controller 16 receives a variety of requests, including a connection request, a display request, an expansion display request, a request to switch to a single-window full screen, and an erase request through the user interface 14 or the communication unit 17, and performs processes responsive to each request. Under the control of the controller 16, the image converter 19A converts the image data acquired by the screen capture processor 19, and the communication unit 17 sends the converted captured image data to the network interactive display device 2.

[0127] The communication unit 17 carries out a two-way communication with the network interactive display device 2. The communication protocol used here is the TCP/IP. The communication unit 17 has a protocol processing function for ARP, ICMP, IP, TCP, UDP, etc. required for the TCP/IP connection. This protocol processing function is carried out under the control of an OS.

[0128] The conversion processes performed by the image converter 19A are required when the display device 2 to be discussed later performs a multi-window screen presentation. Specifically, the conversion processes include a size conversion process to convert the captured image data into data in a display size of a window assigned to own terminal 1, and a color conversion process to convert the captured image data into data having a display color count of the display 21 of the display device 2. The terminal 1 performs the conversion processes, required to present a multi-window screen on the display device 2, on the captured image data acquired by the screen capture processor 19, and then sends the converted captured image data to the display device 2.

[0129] FIG. 3 is a block diagram illustrating the structure of the display device 2 of the first preferred embodiment.

[0130] The display device 2 includes the display 21, a display control unit 22 which has a multi-window screen presentation function, an expansion display function, a function to switch to the single-window full screen, an insertion function, and an erase function, and controls the display screen to be presented on the display 21, an input section 23 including a remote controller, a mouse, or a keyboard, a user interface 24 for detecting an operational input from the input section 23 and for outputting the operational input to a controller 27 to be discussed later, a program storage 25 for storing the display control program to perform the multi-window screen presentation function of the present invention, a data storage 26 for storing a variety of files and data required to carry out the display control program, a controller (CPU) 27 for generally controlling the display device 2, and a communication unit 28 for performing a two-way communication with each terminal 1.

[0131] The communication unit 28 carries out a two-way communication with the terminal 1. The communication protocol used here is the TCP/IP. The communication unit 28 has a protocol processing function for ARP/ICMP, IP, TCP, UDP, etc. required for the TCP/IP connection.

[0132] The display device 2 may be a plasma display, or a liquid-crystal display instead of the projector shown in FIG. 1. FIG. 3 shows major portions only related to the context of the present invention, and does not show other elements respectively uniquely relating to the projector, the plasma display, and the liquid-crystal display because they are not closely related to the context of the present invention. If the elements shown in FIG. 3 are added to each of an existing projector, an existing plasma display, and an existing liquid-crystal display, they respectively become a network interactive projector, a network interactive plasma display, and a network interactive liquid-crystal display. The display 21 is different depending on the type of the display device 2. Specifically, the display 21 is one of a liquid-crystal light valve, an LCoS light valve, or a DMD (Digital Micromirror Device) (Trademark of Texas Instruments) in the projector. The display screen of the display 21 becomes a projecting screen. The display 21 is a plasma display panel in a plasma display device, a liquid-crystal panel in a liquid-crystal display device, or an organic EL (Electroluminescent) panel in an organic EL display device.

[0133] Referring to FIG. 4, a variety of files stored in the data storage 26 is discussed.

[0134] The data storage 26 stores a display specification management file 30, a permitted connection management file 31, a permitted display management file 32, a connection status management file 33, a display status management file 34, a tentative window area setting file 35, and a window area information file 36. The data storage 26 further includes a captured image data memory 37 for storing the captured image data sent from each terminal 1.

[0135] The display specification management file 30

registers a screen size representing the number of pixels in vertical and horizontal directions of the display screen of the display 21, and color count information representing a display color count of the display 21. In this preferred embodiment, the screen size is 1280x1024 (SXGA), and the color count is 167,777,216 colors.

[0136] The permitted connection management file 31 registers a terminal name of a terminal 1 which is permitted for connection. The permitted display management file 32 registers a terminal name of a terminal 1 which is permitted for screen display.

[0137] The connection status management file 33 registers a terminal name of a terminal 1 which is currently connected to the display device 2.

[0138] The display status management file 34 manages a display status of the current display 21. The display status management file 34 manages, in a table form, terminal information relating to the terminal 1 that is a source of the captured image data currently presented on the display screen of the display 21. The display status management file 34 is updated each time the display screen of the display 21 is modified. For example, if the display screen is switched from a four-window screen to a three-window screen, terminal information of the terminal 1 corresponding to an erased window is deleted. If the display screen is switched from a four-window screen to a five-window screen, terminal information of the terminal 1 corresponding to an added window is newly registered.

[0139] FIG. 5 illustrates items of the terminal information managed in the display status management file 34.

[0140] The display status management file 34 contains, as items thereof, a "terminal name", an "IP address", a "screen size", "color count information", "priority", a "capture area management flag", a "difference capture management flag", a "captured image size", a "difference captured image size 1", a "difference captured image size 2", a "difference capture origin 1", and a "difference capture origin 2".

[0141] The "terminal name" is a name provided beforehand to the terminal 1. The "screen size" is the number of pixels in the vertical and horizontal directions of the display screen of the display 11. For example, an SXGA terminal has 1280x1024 pixels, and an XGA terminal has 1024x768 pixels. The "color count information" represents the number of display colors of the display 11, and may be 256 colors, or 167,777,216 colors, for example. The terminal name, the IP address, the screen size, and the color count information are the items that must be stored in the display status management file 34 during a registration. Other items are set (updated) by the user as necessary.

[0142] The "priority" determines the size of the display size of each window assigned to the terminal 1 that is identified by the terminal name. The priority takes "highest", "high" or "none". As will be discussed in detail, the display size having a higher priority order becomes larger. The "capture area management flag" manages the capturing as to whether the screen of the terminal 1 identified by the terminal name is captured in a full-screen capture mode or a partial-screen capture mode. The capture area management flag is "0" in the full-screen capture mode, which is a standard capture mode, and "1" in the partial-screen capture mode.

[0143] The "difference capture management flag" manages the capture of whether the screen of the terminal 1 identified by the terminal name is captured in a normal capture mode or a change capture mode (hereinafter referenced to as a difference capture mode). The difference capture management file is "0" in the normal capture mode, or "1" in the difference capture mode.

[0144] The "captured image size" is the size of the captured image data (the number of pixels in the vertical and horizontal directions) when the capture area management flag is "1", i.e., in the partial-screen capture mode.

[0145] The "difference captured image size 1" and the "difference captured image size 2" represent the sizes of two different areas acquired in the difference capture when the difference capture management flag is "1". The "difference capture origin 1", and the "difference capture origin 2" are the origins of the two different areas acquired in the difference capture, and are the absolute coordinates within an area defined by the captured image size.

[0146] The tentative window area setting file 35 is a file in which information identifying a tentative window area assigned to the terminal 1 is set beforehand. The tentative window area setting file 35 contains a plurality of tables, each table prepared for the terminals. The table has a structure as shown in FIG. 11A and FIG. 16A. The table will be discussed in more detail later. The window area information file 36 will also be discussed later.

[0147] When a predetermined operation is performed on the input section 23, the display 21 displays the contents of the files 30, 31, 32, 33, 34, 35, and 36. The user thus checks and modifies the data on the display screen at will.

[0148] Returning to FIG. 4, the display control unit 22 includes a window area information generator 41 as a display size determining unit, an image synthesizer 42, and an image processor 43. The controller 27 receives a variety of requests such as a connection request, a display request, an insertion display request, an erase request, etc., received through the user interface 24 or the communication unit 28. In response to these requests, under the control of the controller 27, the processors 41, 42, and 43 respectively perform required processes while accessing necessary files in the data storage 26. The controller 27 thus controls the display 21. A display control program, stored in the program storage 25, for providing a multi-window screen presentation function and the controller (CPU) 27 constitute the display control unit 22.

[0149] From the display status management file 34,

the window area information generator 41 learns the number of terminals 1 to be presented, and the priority order and the screen size of each terminal 1. The window area information generator 41 splits the display screen of the display 21 in accordance with the number of terminals 1 to be presented, and the priority order and the screen size of each terminal 1. The window area information generator 41 generates the window area information containing display size (hereinafter referred to as a window area size) of the window on the display 21 assigned to each terminal 1 to be displayed, and information identifying the display position of the window (the absolute coordinates at the top left corner of the window with respect to the display screen, hereinafter also referred to as an origin). The information is stored in the data storage 26 as the window area information file 36.

[0150] The controller 27 sends, to each terminal 1 to be displayed from the communication unit 28, the window area size of the window assigned to each terminal 1 to be displayed in the window area information file 36 generated in the window area information generator 41 together with the display color count of the display 21 held in the display specification management file 30. The captured image data memory 37 then stores the captured image data returned from each terminal 1 that has received these pieces of information, namely, the captured image data that has been subjected to the size conversion process and the color conversion process in accordance with the received window area size and display color count. The information referred to as the window area size is identical to a true window area size in the discussion that follows.

[0151] The image synthesizer 42 synthesizes the size converted and color converted captured image data from each terminal 1 stored in the captured image data memory 37 in accordance with the window area information file 36 generated by the window area information generator 41. Synthesized image data thus results.

[0152] The image processor 43 performs a scanning frequency conversion process on a variety of pieces of image data such as the synthesized image data generated by the image synthesizer 42, and the display status management file 34 of the data storage 26 which is referenced using an OSD (on-screen display) function, thereby generating display image data and outputting the display image data to the display 21. The image processor 43 includes a scan converter, for example.

[0153] The operation of the first preferred embodiment of the present invention will now be discussed. FIGS. 6 and 7 are flow diagrams illustrating the operation of the first preferred embodiment.

[0154] A predetermined operational input is entered in the input section 23 in the display device 2 in a preliminary step for multi-window screen presentation. Upon detecting the operational input through the user interface 24, the controller 27 broadcasts a request to return a terminal name and an IP address together with the IP address of the display device 2 through the communication unit 28 and the network 3. When each terminal 1 receives the broadcast request to return the terminal name and the IP address, the terminal 1 returns own terminal name and IP address to the display device 2.

[0155] The display device 2 receives a reply (the terminal name and the IP address) from each terminal 1 through the communication unit 28, and determines whether each terminal is a connection permitted terminal. Specifically, the display device 2 determines whether the returned terminal name agrees with a terminal name registered in the permitted connection management file 31. If it is determined that the returned terminal name agrees with the registered terminal name, the display device 2 handles the terminal 1 as a connection permitted terminal.

[0156] The terminal names and the IP addresses of the terminals 1 determined as connection permitted terminals are successively registered in the connection status management file 33. The connection status management file 33 allows the display device 2 to learn how many terminals 1 are currently connected. Since the determination of whether the connection is permitted or not is based on the terminal name, the system works even if the IP address, provided to the terminal 1 using the DHCP, becomes different each time connection is made.

[0157] The display device 2 waits on standby for any request after the above preliminary step is complete. For example, the display screens of the four terminals 1a-1d, out of the terminals 1 operated by conference participants, are presented on a multi-window display screen 50 of the display device 2. As for the resolutions thereof, the terminal 1a has an SXGA resolution (1280x1024 pixels), the terminal 1b has an SVGA resolution (800x600 pixels), the terminal 1c has an XGA resolution (1024x768 pixels), and the terminal 1d has a resolution of 480x640 pixels.

Multi-Window Screen Presentation Function

[0158] FIG. 8 illustrates the configuration of the display system in which display screens of four terminals 1a-1d are presented on the display screen of the display device 2.

[0159] The user operates the remote controller in the input section 23 to enter an operational input to display the screens of the terminals 1a-1d. Through the user interface 24, the controller 27 is notified of the input information, namely, a request to display the screens of the terminals 1a-1d together with identification information of the terminals 1a-1d (step S1) When the request is placed, the priority order, the partial capture, and the difference capture may also be designated. Here, no particular designation is performed.

[0160] Upon receiving the display request, the controller 27 in the display device 2 performs processes in

steps S3-S9 for each of the terminals 1a-1d to be displayed (step S2). More specifically, the controller 27 references the permitted connection management file 31 and the permitted display management file 32 according to the terminal name indicated by the identification information contained in the display request, thereby determining whether or not each terminal 1 is permitted for connection and whether or not each terminal 1 is permitted for display (step S3). If it is determined that each terminal 1 is permitted for both connection and display (step S4), the controller 27 requests, through the communication unit 28, each terminal 1 to send the terminal information (the terminal name, the IP address, the screen size, and the color count information) (step S5). The controller 27 receives the terminal information which has been sent in response to the request (step S6), and registers the terminal information in the display status management file 34 (step S7). If the priority order, the partial capture, and the difference capture are designated during the placement of the display request, the priority order, the capture area management flag, and the difference capture management flag are also registered in the registration in step S7.

[0161] The controller 27 sends the display status management file 34 and a screen capture start command to the terminal 1 which is permitted for connection and display (step S8). When any terminal 1 is not permitted for connection and display, the controller 27 sends a notification to that effect to the terminal 1 (step S9).

[0162] If all four terminals 1a-1d are permitted for connection and display, the terminal information from the terminals 1a-1d is registered in the display status management file 34 in the processes in steps S2-S9. At the same time, the screen capture start command is sent together with the display status management file 34 to each of the terminals 1a-1d through the communication unit 28.

[0163] Subsequent to the above processes, the controller 27 notifies the window area information generator 41 in the display control unit 22 of a window area split request. The display device 2 then enters a window area information generation process (step S10). The operation of the terminal 1 having received the screen capture start command will be discussed later. Discussed first is the window area information generation process performed by the window area information generator 41 in response to the window area split request.

[0164] FIG. 9 is a flow diagram illustrating the flow of a window area information generation process. The operation of the window area information generator 41 is specifically discussed on the assumption that the display status management file 34 is constructed as shown in FIG. 10. As shown in FIG. 10, terminal names PC-1, PC-2, PC-3, and PDA-1 correspond to the terminals 1a, 1b, 1c and 1d, respectively.

[0165] Upon receiving the window area split request from the controller 27, the window area information generator 41 learns the number of the terminals 1 to be displayed (here, four terminals 1) referencing the display status management file 34. The window area information generator 41 also learns the priority order of each of the terminals 1a-1d (step S21). The window area information generator 41 references the tentative window area setting file 35 according to the number of terminals 1 and the priority order of each of the terminals 1a-1d, and acquires a tentative size and a tentative origin of each tentative window area assigned to each of the terminals 1a, 1b 1c, and 1d (step S22). As will be clarified later, the adjective "tentative" is used because the area window here assigned to the terminal 1 is updated in a later step to size convert the captured image data.

[0166] As shown in FIG. 10, the four terminals 1 are to be displayed here and no priority order is set to all of the four terminals 1. A tentative area setting table in the tentative window area setting file 35 is organized as shown in FIG. 11A. Here, the display screen of the display 21 has a resolution of 1280x1024 (SXGA), and the tentative area setting table shown in FIG. 11A is organized based on this display screen. FIG. 11B shows the tentative window area based on the table window area setting table shown in FIG. 11A.

[0167] The priority order shown in FIG. 11A is determined based on the "priority" item in the display status management file 34, and the terminals 1 are first, second, third, and fourth from the high order to the low order. The terminals 1 are assigned the "tentative size" and the "tentative origin" for the tentative window area in the lower table. All the terminals 1a-1d have "none" in the priority order row with no priority order set therefor (see FIG. 10). If no priority order is set, the order of assignment may be a predetermined one, or may be the order of registration to the display status management file 34. In the first preferred embodiment, the terminals 1a, 1b 1c, and 1d (hereinafter referred to as the terminal names PC-1, PC-2, PC-3, and PDA-1 as appropriate) are assigned tentative window areas 50A, 50B, 50C, and 50D in that order.

[0168] The window area information generator 41 further acquires the screen sizes of the PC-1, PC-2, PC-3, and PDA-1 from the display status management file 34 (see FIG. 10), and determines the sizes and origins of true windows respectively assigned thereto based on the acquired screen sizes (step S23).

[0169] FIG. 12 illustrates the true window area size and the true origin. As shown, 51A, 51B, 51C, and 51D represent the true window areas assigned to the PC-1, PC-2, PC-3, and PDA-1, respectively. The captured image data to be displayed on the tentative window area is size converted with the aspect ratio thereof maintained. The true window areas are display areas of the tentative window areas 50A, 50B, 50C, and 50D in which the converted images are respectively displayed with the centers thereof aligned to be centered on the respective tentative window areas. The PC-2 is now specifically discussed in connection with the true win-

dow area size to determine the true window area. The screen size of the PC-2 is 1024x768 pixels (see FIG. 10). The image data of this size is contracted with the aspect ratio thereof (namely, the aspect ratio of the display screen of the display 11) maintained so that the image data is displayed within the window area 50B having the size of 640x512 pixels assigned to the PC-2. The contracted size is thus the true window area size. The true origin is used to place the window of that size at the center of the window area 50B as shown in FIG. 12, and is represented in pixel coordinates at the top left corner of the window (the absolute coordinates with respect to the entire display screen).

[0170] The window area information generator 41 determines the above-referenced true window area sizes and true origins for the PC-1, PC-2, PC-3, and PDA-1, and generates window area information containing the terminal name item, the window area item, and the origin item as shown in FIG. 13, and then stores the window area information in the data storage 26 as the window area information file 36 (step S24). The window area information generation process thus ends. The window area information file 36 is tagged with processing date (May 21, 2002, 17:00:32, for example).

[0171] Returning to FIG. 6, the controller 27 in the display device 2 performs processes in steps S12-S14 to each of the terminals 1a, 1b 1c, and 1d to be displayed (step S11) when the window area information generator 41 completes the window area information generation process (step S10). More specifically, the controller 27 places a request to send the captured image data (step S12). The sent request to send the captured image data includes the true window area size assigned to the terminal 1 to which the request is sent, and the display color count of the display 21 of the display device 2 stored in the display specification management file 30. For example, the request to send the captured image data including the true window area size of 640x512 (see FIG. 13) and the display color count of 167,777,216 of the display device 2 is sent to the terminal 1a (PC-1).

[0172] Upon receiving the capture start command sent from the display device 2 in step S8, the terminal 1 starts capturing the screen thereof. If the screen capture performed by the terminal 1 is a full-screen capture, the terminal 1 sends, to the display device 2, the captured image data which has been subjected to the size conversion process and the color conversion process in accordance with the true window area size and the display color count contained in the request to send the captured image data, in response to the request to send the captured image data sent in step S12. If the screen capture performed by the terminal 1 is a partial-screen capture, an image size of the partial-captured image is sent to the display device 2.

[0173] The display device 2 receives the reply from the terminal 1 (step S13). If the rely is the captured image data, the display device 2 determines that the screen capture performed by the terminal 1 is a full-screen capture (step S14), and the received captured image data is written onto the captured image data memory 37 (step S18).

[0174] If the reply from the terminal 1 received in step S13 is the image size, the controller 27 determines the screen capture performed by the terminal 1 is a partial-screen capture (step S14). The captured image size in the display status management file 34 is updated with the received image size. The controller 27 regenerates the window area information (the true window area size and the true origin) based on the received image size (step S15). The controller 27 updates the required portion of the window area information file 36, and sends a request to send recaptured image data responsive to the regenerated true window area size and the display color count of the display 21 (step S16). The terminal 1 receives the request to send the recaptured image data. The terminal 1 returns, to the display device 2, the captured image data which has been subjected to the size conversion process and the color conversion process in accordance with the true window area size and the display color count of the display 21, contained in the request to send the recaptured image data. The display device 2 receives the reply from the terminal 1 (step S17), and writes the reply onto the captured image data memory 37 (step S18).

[0175] The above process is performed for each of the terminals 1a-1d. When the captured image data is received from all terminals 1a-1d, the controller 27 sends an image synthesis command to the image synthesizer 42. The display device 2 enters an image synthesis process (step S19).

[0176] Upon receiving the image synthesis command, the image synthesizer 42 identifies locations of synthesis of the size-converted captured image data and the color-converted captured image data stored in the captured image data memory 37 in accordance with the true origin of the window area information in the window area information file 36, and synthesizes the captured image data into a single screen image data, thereby generating the synthesized image data. The synthesized image data is then output to the image processor 43.

[0177] The image processor 43 converts the synthesized data from the image synthesizer 42 in display image data having a scanning frequency of the display 21. The display image data is then output to the display 21. As shown in FIG. 8, a multi-window screen is thus present on the display screen 50 in which the captured image data (display screen) of the terminals 1a, 1b 1c, and 1d is presented on the true window areas (hereinafter also referred to as window screens) of 51A, 51B, 51C, and 51D (step S20).

[0178] The operation of the terminal 1 having received the capture start command and the display status management file 34 from the display device 2 is discussed below.

[0179] FIG. 14 is a flow diagram of the operation of

the terminal 1 which has received the capture start command and the display status management file 34 from the display device 2. The terminal 1 is here 1a (PC-1).

[0180] The controller 16 in the terminal 1a receives, through the communication unit 17, the capture start command and the display status management file 34 sent from the display device 2 (step S31). The controller 16 references the capture area management flag in the terminal 1a in the display status management file 34 (step S32). Since the capture area setting flag is "0" (step S33), the full-screen capture is determined to be activated. The controller 16 sends a full-screen capture command to the screen capture processor 19. In response to the full-screen capture command, the screen capture processor 19 stores the content of the video memory 12 (i.e., the content currently displayed on the display screen of the display 11) in the storage 15 in a bit-map format (a full-screen capture process) (step S34).

[0181] When the terminal 1a receives, from the display device 2, the request to send the captured image data (step S35), the terminal 1a performs the size conversion on the captured image data acquired in the full-screen capture process in step S34 in accordance with the true window area size contained in the request to send the captured image data while performs the color conversion process on the captured image data in accordance with the display color count contained in the request to send the captured image data (step S36). Since the terminal 1a (PC-1) has a screen size of 1280x1024 pixels (see FIG. 10), the captured image data of this size is converted (in a contraction process) into data of size as large as the assigned window area size of 640x512 (see FIG. 13). No color conversion is performed because the display 11 has the same color count of 167,777,216 as the display device 2. If the display 11 has a color count larger than that of the display device 2, the color count is down-converted to match that of the display device 2. The captured image data, size converted and color converted in this way, is sent through the communication unit 17 (step S37).

[0182] If the capture area setting flag is determined to be "1" in step S33, a partial capture is determined to be activated. A capture area designation screen indicating a message saying "designate a capture area" is presented on the display 11 (step S38), and a partial capture command is sent to the screen capture processor 19. When the user, who reads the message on the capture area designation screen, selects a window or encloses a desired area using the input section 13, the screen capture processor 19 recognizes the user operation through the user interface 14. The image data on the video memory 12 corresponding to the designated area and the image size is stored in the storage 15 (a partial capture process) (step S39).

[0183] Upon receiving the request to send the captured image data from the display device 2 (step S40), the terminal 1a returns the size of the partial captured image captured in the partial capture process in step S39 (step S41). The reply is received by the display device 2 as already discussed. The display device 2 regenerates the true window area size based on the image size in the partial capture process, and sends, to the terminal 1a, the request to send the recaptured image data containing the regenerated true window area size and the display color count of the display 21 of the display device 2. Upon receiving the request, the terminal 1a performs the size conversion process on the partial captured image data stored in the storage 15 in step S39, based on the true window area size contained in the request to send the captured image data, while performing the color conversion process on the partial captured image data in accordance with the color count contained in the request to send the captured image data (step S36). The terminal 1a then sends the captured image data, which has been size converted and color converted in this way, to the display device 2 through the communication unit 17 (step S37).

[0184] The above-referenced process is similarly performed on each of the remaining terminals 1b 1c, and 1d in addition to the terminal 1a. As a result, the display device 2 receives, from each of the terminals 1a, 1b 1c, and 1d, the captured image data which has been size converted into the true window area size assigned thereto, and which has been color converted to the display color count of the display 21 of the display device 2.

[0185] Each terminal 1 receives the display status management file 34 from the display device 2. The display status management file 34 is used to check the status of the capture area setting flag of own terminal 1. Furthermore, the content of the file may be displayed on the display 11 by performing a predetermined operation on the input section 13. The permitted connection management file 31, the permitted display management file 32, and the connection status management file 33 may also be acquired from the display device 2 as necessary to be presented on the display 11. In this way, the user may learn what terminals are displayed other than own terminal operated by the user himself and the range of authority granted to own terminal 1.

Expansion Display Function

[0186] An expansion display function for expanding any one of a plurality of currently presented windows is discussed below. The expansion display function is performed by updating the priority order in the above-referenced arrangement.

[0187] FIG. 15 diagrammatically illustrates the display system to explain the expansion display function. The screen of the terminal 1a is expanded by heightening the priority order of the terminal 1a.

[0188] The screen of the terminal 1a is designated by operating the remote controller. If the terminal 1a is assigned any key in the remote controller, the user designates the terminal 1a by pressing that key. If no partic-

ular key is assigned, the user may operate the remote controller to select the terminal 1a on a menu screen on the display 21, or may click the screen of the terminal 1a with a pointer on the display screen using the remote controller.

[0189] Designation information input in this way, i.e., an expansion display request containing the identification information of the terminal 1a, is sent to the controller 27 through the user interface 24. The controller 27 identifies the terminal 1a based on the identification information contained in the expansion display request. The controller 27 sets the priority of the terminal 1a (PC-1) in the display status management file 34 to be "highest", and sends a window area split request to the window area information generator 41.

[0190] The window area information generator 41 generates the window area information file 36 as already described. The tentative window area setting table, which is referenced in the generation of the window area information file 36, is organized as illustrated in FIG. 16A. FIG. 16B shows tentative window areas based on the tentative window area setting table. The priority order illustrated in FIG. 16B is determined based on the priority order in the display status management file 34. The priority order of the terminal 1a is higher than those of the remaining terminals 1b, 1c, and 1d. The terminal 1a is thus assigned the tentative window area 52A (the window area for the first terminal) having the first priority in FIG. 16B. The assignment of the window areas to the remaining terminals 1b, 1c, and 1d having no priority order set therefor is arbitrary. For example, the terminals 1b, 1c, and 1d are now assigned tentative window areas 52B, 52C, and 52D, respectively. As already described, the true window areas to be assigned to the terminals 1b, 1c, and 1d are determined.

[0191] FIG. 17 illustrates the true window areas. The terminals 1a, 1b 1c, and 1d are assigned the true window areas 53A, 53B, 53C, and 53D, respectively. The window area information file 36 is then organized as illustrated in FIG. 18.

[0192] As already described, the captured image data (display screen) of the terminals 1b 1c, and 1d appears on the true window areas 53A, 53B, 53C, and 53D, respectively. The designated window 51A is shown in an expanded state thereof on the multi-window screen 50.

Function to Switch to Single-Window Screen

[0193] One of the plurality of multi windows is shown on a single-window screen as shown in FIG. 19. The user may operate the remote controller to enter an operational input for the function to switch to a single-window screen. More specifically, the controller 27 is notified of the input information, namely, the single-window display request containing the identification information of the terminal 1c corresponding to the window 51C to be displayed on the single-window screen. The controller 27 identifies the terminal 1c based on the identification information contained in the single-window display request. The controller 27 sets the priority order item of the terminal 1c (PC-3) in the display status management file 34 to be the highest, thereby sending a window area split request to the window area information generator 41.

[0194] As a result, the multi-window screen is replaced with the single-window screen as shown in FIG. 19. The user may return to the multi-window screen by performing a predetermined operation on the remote controller to set the priority order to "none".

[0195] The switching to the single-window screen allows the user to recognize details, which are not visible in the contracted scale on the window. The ease of use is assured because the predetermined operation quickly returns the screen to the multi-window screen.

Insertion Function

[0196] As shown in FIG. 20, a new window may be inserted into a currently presented multi-window screen. Such an insertion corresponds to a display request subsequent to the display of a multi-window screen. The screen insertion is thus performed in the same process as in the display request process.

Erase Function

[0197] As shown in FIG. 21, one of the plurality of currently presented windows may be erased. The user operates the remote controller to enter an operational input for the erase function. More specifically, the input information, namely, an erase request containing the identification information of the terminal 1d corresponding to the window 51D to be erased is sent to the controller 27 through the user interface 24. The controller 27 identifies the terminal 1d based on the identification information contained in the erase request. The controller 27 deletes the terminal information of the terminal 1d from the display status management file 34, and sends a window area split request to the window area information generator 41. The subsequent process remains identical to the one already discussed. The window 50D designated for erasure is erased as shown in FIG. 21. The multi-window screen is reorganized so that a plurality of windows corresponding to the number of terminals subsequent to the erasure are presented. Alternatively, the window 51D designated for erasure may be merely erased.

[0198] The first preferred embodiment of the present invention provides the display system 100 having the multi-window screen presentation function in which the screens of the plurality of terminals 1 connected to the network are presented on the plurality of windows on the display screen of the display device 2. The processes required to perform the multi-window screen presentation function, i.e., the size conversion process and the color conversion process, are performed on the terminal

1. This arrangement dramatically reduces the workload on the display device 2, in comparison with the case in which the display device 2 performs the same processes on the captured image data sent from the terminal 1. Since the size conversion process and the color conversion process are performed by the terminal 1, the effect of an increase in the number of terminals 1 on processes to be performed by the display device 2 is minimized in the display system 100.

[0199] The workload on the network 3 is also reduced because the terminal 1 performs the size conversion process on the captured image data before the transmission of the captured image data to the display device 2 over the network 3.

[0200] The ease of use of the system 100 is assured because the expansion display function, the switching function to the single-window screen, the insertion function, and the erase function are available in addition to the multi-window screen presentation function.

[0201] The captured image data acquired in the terminal 1 is presented on the corresponding window on the display screen of the display device with the aspect ratio thereof maintained. The display screen of the display device is thus free from discordance.

[0202] Rather than updating the display screen each time the conference participant (the user) places the display request through the input section 23, the display device 2 itself updates the display screen thereof every three seconds, for example. In this case, the controller 27 in the display device 2 controls timings, thereby performing subsequent processes as described above at regular intervals. The constantly updated display screen of each terminal 1 is viewed on the display of the display device 2.

Difference Capture Function

[0203] The full-screen capture method and the partial-screen capture method have been described. The display system 100 also provides a method in which a change in the display screen on the terminal 1 is detected and image data obtained by capturing the change only is sent.

[0204] The user operates the remote controller of the input section 23 to enter an operational input to perform a difference capture on each of the terminals 1a-1d. More specifically, the difference capture management flag in the display status management file 34 is set to be "1".

[0205] For a first cycle of process immediately subsequent to the setting of the difference capture management flag to "1", steps S1-S20 are performed as described above to present the multi-window screen.

[0206] After the completion of the multi-window presentation, the controller 27 in the display device 2 sends a difference capture start command together with the display status management file 34 to the terminal 1 with the difference capture management flag thereof set to "1" through the communication unit 28 and the network 3.

[0207] The operation of the terminal 1 having received the difference capture start command and the display status management file 34 from the display device 2 will be discussed below.

[0208] FIG. 22 is a flow diagram illustrating the operation of terminal which has received the difference capture start command and the display status management file 34 from the display device 2. Here, the terminal of interest is the terminal 1a (PC-1).

[0209] The data management processor 18 in the terminal 1a receives, through the communication unit 17, the difference capture start command and the display status management file 34 sent by the display device 2 (step S41). The terminal 1a thus performs a subsequent full-screen capture process. More specifically, the screen capture processor 19 stores the content of the video memory 12 in the storage 15 (step S42). The image data obtained here is referred to as pre-full-screen data.

[0210] The screen comparison processor 20 references the difference capture management flag in the display status management file 34, received by the data management processor 18, at any regular intervals set (once every 0.5 second, for example) (step S43). If the difference capture management flag is "1" (step S44), a subsequent difference capture operation is performed.

[0211] To quit the difference capture operation, the user simply sets the difference capture management flag to "0" in the same way as the display status management file 34 is modified. The screen comparison processor 20 determines whether or not the capture operation is suspended, by referencing the difference capture management flag.

[0212] After performing the full-screen capture process, the screen capture processor 19 stores the content of the video memory 12 in the storage 15 (step S45). The image data obtained here is referred to as post-full-screen data. The screen comparison processor 20 in the controller 16 compares the pre-full-screen data with the post-full-screen data (step S46).

[0213] A screen comparison process is discussed in which a mouse pointer is moved (see FIG. 23). The mouse pointer changes the position thereof from pre-full-screen data 60 and post-full-screen data 61. As shown in FIG. 24, two areas 70 and 71 are recognized as being changed. The screen comparison processor 20 detects a change. If it is determined that there has been a change in the screen (step S47), the screen comparison processor 20 acquires image data of an area that has undergone a change, a size of the image data (the number of pixels in vertical and horizontal directions), and coordinates of an origin of the image data (absolute coordinates within the area defined by the captured image size in the display status management file 34).

[0214] In this case, the screen comparison processor

20 acquires, with respect to the area 70, captured image data of the area 70 (hereinafter referred to difference captured image data 1), a difference captured image size 1, and a difference capture origin 1, and with respect to the area 71, captured image data of the area 71 (hereinafter referred to difference captured image data 2), a difference captured image size 2, and a difference capture origin 2. The screen comparison processor 20 then stores these pieces of information in the storage 15 while notifying the data management processor 18 that the difference captured image data has been acquired (step S48). The difference captured image size 1, the difference captured image size 2, the difference capture origin 1, and the difference capture origin 2 are written on the respective portions thereof in the display status management file 34.

[0215] The data management processor 18 sends these pieces of data to the display device 2 through the communication unit 17 and the network 3 (step S49). The difference capture function is different from the full-screen capture and the partial-screen capture. More specifically, the difference capture function is performed not in response to the request to send received from the display device 2 but in response to the change in the screen detected by the screen comparison processor 20. The transmission operation of the captured image data is then performed.

[0216] The post-full-screen data is set to be pre-full-screen data for a subsequent screen comparison process (step S50).

[0217] The display device 2 then receives the difference captured image data 1, the difference captured image data 2, and the display status management file 34 from the terminal 1a. The operation of the display device 2 subsequent to the reception of these pieces of data will now be discussed.

[0218] Upon receiving the difference captured image data 1, the difference captured image data 2, and the display status management file 34 from the terminal 1a at the communication unit 28, the controller 27 transfers an image synthesis command to the image synthesizer 42. The display device 2 enters the image synthesis process in the difference capture function.

[0219] Upon receiving the image synthesis command, the image synthesizer 42 rewrites portions of the captured image data stored in the captured image data memory 37 corresponding to the difference captured image data 1 and the difference captured image data 2, based on the window area information file 36 corresponding to the image displayed on the display 21 and the display status management file 34 (the difference captured image size 1, the difference captured image size 2, the difference capture origin 1, and the difference capture origin 2) received from the terminal 1a. The process subsequent to this operation are identical to those in steps S19 and S20.

[0220] The amount of image data transmitted over the network 3 is smaller in the difference capture process than in the full-screen capture (or the partial-screen capture) process. The workload on the network 3 is thus reduced. The user constantly monitors an updated image of the terminal 1.

[0221] The above description of the difference capture process is based on the assumption that a dedicated program installed on the terminal 1 is used to capture the screen. If a driver for directly detecting a difference in the content of the video memory is available on the operating system (OS), such a driver may be used.

[0222] The image data may be exchanged in a compression standard format (such as JPEG) between the terminal 1 and the display device 2 to reduce the workload on the network 3.

[0223] In the above description, a variety of requests such as the display request and the single-window screen display request is performed by operating the input section 23 on the display device 2. In other words, the display device 2 has the initiative in the organization of the screen. Alternatively, each terminal 1 may have the initiative. The conference participant (the user) enters a desired operational input by operating the input section 13 on own terminal 1. The input information is transferred to the controller 16 through the user interface 14. The controller 16 in turn sends the request, including the terminal name and the IP address of own terminal 1, responsive to the input information to the display device 2 via the communication unit 17 and the network 3. The request is received by the communication unit 28 in the display device 2 through the network 3. The request is then transferred to the controller 27. The operation subsequent thereto remains the same as those already discussed. In this way, a variety of requests may be placed using the terminal 1.

[0224] The terminal 1 may designate the capture area by containing information, which designates the full-screen capture or the partial-screen capture, in the variety of requests.

[0225] The priority order may be designated by the user as necessary as described above. Alternatively, a plurality of terminals 1 which are scheduled to be connected to the display device 2 may be assigned beforehand priority order. If the terminals 1 are assigned beforehand the priority order, the priority assigned to each terminal 1 is automatically set in the priority item of the display status management file 34 when the terminal information is registered in the display status management file 34.

[0226] In the above description, the tentative window area is determined based on the tentative window area setting file 35. Alternatively, the tentative window area may be determined through calculation each time.

[0227] In the partial capture, the terminal 1 returns the image size to the display device 2. The display device 2 regenerates the true window area in response to the received image size. The regeneration of the true window area may be performed by the terminal 1.

Second Embodiment

[0228] FIG. 1 illustrates a network of a display system 100 including a network interactive display device 2 in accordance with preferred embodiments of the present invention.

[0229] The display system 100 includes a plurality of terminals (only four terminals 1a, 1b, 1c, and 1d are shown in FIG. 1), and the network interactive display device 2 (a projector here) having a multi-window screen presentation function as one of major functions of the present invention. The plurality of terminals 1 are respectively connected to the network interactive display device 2 through a network 3 in a two-way communication based on the TCP/IP protocol. A unique name is provided beforehand to each terminal 1 (hereinafter referred to as a terminal name). The network 3 may be any of a LAN (Local Area Network), a radio LAN, and a near-field communication radio LAN such as Bluetooth (Tradename of Bluetooth SIG Inc., U.S.A.).

[0230] The display system 100 allows screens presented on the plurality of terminals 1 to be concurrently presented on a multi-window display screen of the network interactive display device 2. Such a system 100 is useful in a conference or a presentation. The terminal 1 and the network interactive display device 2 will now be discussed in detail.

[0231] FIG. 26 is a block diagram illustrating the structure of the terminal 1 in accordance with a second preferred embodiment of the present invention.

[0232] The terminal 1 may be a personal computer or a PDA (Personal Digital Assistant). The terminal 1 includes a display 11 for presenting a diversity of information such as materials for presentation, a video memory 12 for storing the content to be presented on the display 11, an input section 13 including a tablet, a mouse, or a keyboard, a user interface 14 for detecting an operational input from the input section 13 and outputting the operational input to an arithmetic unit (CPU) 16, a storage 15 for storing application software programs (such as a control program) for performing the processes of the present invention, the arithmetic unit 16, and a communication unit 17.

[0233] The control program stored in the storage 15 is used to perform a terminal control function to achieve a multi-window screen presentation function on the network interactive display device 2, a screen capture function to capture a whole or a part of the screen of the display 11, an image conversion function to convert captured image data acquired by the screen capture function into data in a format of a display 21 of the network interactive display device 2, and a function to detect a change on the screen of the display 11. The application software programs and the CPU constitute a data management processor 18, a screen capture processor 19, and a screen comparison processor 20.

[0234] The data management processor 18 receives a variety of requests, including a connection request, a display request, an expansion display request, a request to switch to a single-window full screen, and an erase request through the user interface 14 or the communication unit 17, and performs processes responsive to each request. The data management processor 18 sends the captured image data, acquired by the image capture processor 19, to the display device 2 through the communication unit 17.

[0235] The communication unit 17 carries out a two-way communication with the network interactive display device 2. The communication protocol used here is the TCP/IP. The communication unit 17 has a protocol processing function for ARP/ICMP, IP, TCP, UDP, etc. required for the TCP/IP connection. This protocol processing function is carried out under the control of an OS.

[0236] FIG. 27 is a block diagram illustrating the structure of the network interactive display device 2 of the second preferred embodiment.

[0237] The display device 2 includes the display 21, a display control unit 22 which has a multi-window screen presentation function, an expansion display function, a function to switch to the single-window full screen, an insertion function, and an erase function, and controls the display screen to be presented on the display 21, an input section 23 including a remote controller, a mouse, or a keyboard, a user interface 24 for detecting an operational input from the input section 23 and for outputting the operational input to an arithmetic unit 27 to be discussed later, a program storage 25 for storing the display control program to provide the multi-window screen presentation function of the present invention, a data storage 26 for storing a variety of files and data required to carry out a control program, the arithmetic unit (CPU) 27 for generally controlling the display device 2, and a communication unit 28 for performing a two-way communication with each terminal 1.

[0238] The communication unit 28 carries out a two-way communication with the terminal 1. The communication protocol used here is the TCP/IP. The communication unit 28 has a protocol processing function for ARP/ICMP, IP, TCP, UDP, etc. required for the TCP/IP connection.

[0239] The display device 2 may be a plasma display, or a liquid-crystal display instead of the projector shown in FIG. 1. The display 21 is different depending on the type of the display device 2. Specifically, the display 21 is one of a liquid-crystal light valve, an LCoS light valve, or a DMD (Digital Micromirror Device) (Trademark of Texas Instruments) in the projector. The display screen of the video memory 12 becomes a projecting screen. The display 21 is a plasma display panel in the plasma display device, a liquid-crystal panel in the liquid-crystal display device, or an organic EL (Electroluminescent) panel in the organic EL display device.

[0240] Referring to FIG. 28, a variety of files stored in the data storage 25 are discussed.

[0241] The data storage 26 stores a permitted connection management file 31, a permitted display man-

agement file 32, a connection status management file 33, a display status management file 34, a tentative window area setting file 35, and a window area information file 36. The data storage 26 further includes a captured image data memory 37 for storing the captured image data sent from each terminal 1.

[0242] The permitted connection management file 31 registers a terminal name of a terminal 1 which is permitted for connection. The permitted display management file 32 registers a terminal name of a terminal 1 which is permitted for screen display.

[0243] The connection status management file 33 registers a terminal name of a terminal 1 which is currently connected to the display device 2.

[0244] The display status management file 34 manages a display status of the current display 21. The display status management file 34 manages, in a table form, terminal information relating to the terminal 1 that is a source of the captured image data currently presented on the display screen of the display 21. The display status management file 34 is updated each time the display screen of the display 21 is modified. For example, if the display screen is switched from a four-window screen to a three-window screen, terminal information of the terminal 1 corresponding to an erased window is deleted. If the display screen is switched from a four-window screen to a five-window screen, terminal information of the terminal 1 corresponding to an added window is newly registered.

[0245] FIG. 5 illustrates items of terminal information managed in the display status management file 34.

[0246] The display status management file 34 contains, as items thereof, a "terminal name", an "IP address", a "screen size", "color count information", "priority", a "capture area management flag", a "difference capture management flag", a "captured image size", a "difference captured image size 1", a "difference captured image size 2", a "difference capture origin 1", and a "difference capture origin 2".

[0247] The "terminal name" is a name provided beforehand to the terminal 1. The "screen size" is the number of pixels in the vertical and horizontal directions of the display screen of the display 11. For example, an SXGA terminal has 1280x1024 pixels, and an XGA terminal has 1024x768 pixels. The "color count information" represents the number of display colors of the display 11, and may be 256 colors, or 167,777,216 colors, for example. The terminal name, the IP address, the screen size, and the color count information are the items that must be stored in the display status management file 34 during a registration. Other items are set (updated) by the user as necessary.

[0248] The "priority" determines the size of the display size of each window assigned to the terminal 1 that is identified by the terminal name. The priority order takes "highest", "high" or "none". As will be discussed in detail, the display size having a high priority order becomes large. The "capture area management flag" manages the capture as to whether the screen of the terminal 1 identified by the terminal name is captured in a full-screen capture mode or a partial-screen capture mode. The capture area management flag is "0" in the full-screen capture mode, which is a standard mode, or "1" in the partial-screen capture mode.

[0249] The "difference capture management flag" manages the capture of whether the screen of the terminal 1 identified by the terminal name is captured in a normal capture mode or a change capture mode (hereinafter referenced to as a difference capture mode) for only a change on the display screen. The difference capture management file is "0" in the normal capture mode, or "1" in the difference capture mode.

[0250] The "captured image size" is the size of the captured image data (the number of pixels in the vertical and horizontal directions) when the capture area management flag is "1", i.e., in the partial-screen capture mode.

[0251] The "difference captured image size 1" and the "difference captured image size 2" represent the sizes of two different areas acquired in the difference capture when the difference capture management flag is "1". The "difference capture origin 1", and the "difference capture origin 2" are the origins of the two different areas acquired in the difference capture, and are the absolute coordinates within an area defined by the captured image size.

[0252] The tentative window area setting file 35 is a file in which information identifying a tentative window area assigned to the terminal 1 is set beforehand. The tentative window area setting file 35 contains a plurality of tables, each table prepared for the terminals. The table has a structure as shown in FIG. 11A and FIG. 16A. The table will be discussed later. The window area information file 36 will also be discussed later.

[0253] When a predetermined operation is performed on the input section 23, the display 21 displays the contents of the files 31, 32, 33, 34, 35, and 36. The user thus checks and modifies the data on the display screen at will.

[0254] Returning to FIG. 28, the display control unit 22 includes a window area information generator 41, an image synthesizer 42, and an image processor 43. The arithmetic unit 27 receives a variety of requests such as the connection request, the display request, the insertion display request, the erase request, etc., received through the user interface 24 or the communication unit 28. In response to these requests, under the control of the arithmetic unit 27, the processors 41, 42, and 43 respectively perform required processes while accessing necessary files in the data storage 26. The arithmetic unit 27 thus controls the display 21. A display control program, stored in the program storage 25, for providing a multi-window screen presentation function and the arithmetic unit (CPU) 27 constitute the display control unit 22.

[0255] From the display status management file 34,

the window area information generator 41 learns the number of terminals 1 to be presented, and the priority order and the screen size of each terminal 1. The window area information generator 41 splits the display screen size of the display 21 in accordance with the number of terminals 1 to be presented, and the priority order and the screen size of each terminal 1. The window area information generator 41 generates the window area information containing display size (hereinafter referred to as a window area size) of the window on the display 21 assigned to each terminal 1 to be displayed, and information identifying the display position of the window (the absolute coordinates at the top left corner of the window with respect to the display screen, hereinafter also referred to as an origin). The information is stored in the data storage 26 as the window area information file 36.

[0256] The image synthesizer 42 performs various processes including a contraction process, an expansion process, and a color conversion process on the captured image data stored in the captured image data memory 37, and then synthesizes the captured image data in accordance with the window area information file 36 generated in the window area information generator 41.

[0257] The image processor 43 performs a scanning frequency conversion process on a variety of pieces of image data such as the synthesized image data generated in the image synthesizer 42, and the display status management file 34 of the data storage 26 which is referenced using an OSD (on-screen display) function, thereby generating display image data and outputting the display image data to the display 21. The image processor 43 includes a scan converter, for example.

[0258] The operation of the second preferred embodiment of the present invention will now be discussed. FIG. 29 is a flow diagram illustrating the operation of the second preferred embodiment.

[0259] A predetermined operational input is entered in the input section 23 in the display device 2 in a preliminary step for multi-window screen presentation. Upon detecting the operational input through the user interface 24, the arithmetic unit 27 broadcasts a request to return a terminal name and an IP address together with the IP address of the display device 2 through the communication unit 28 and the network 3. When each terminal 1 receives the broadcast request to return the terminal name and the IP address, the terminal 1 returns own terminal name and IP address to the display device 2.

[0260] The display device 2 receives a reply (the terminal name and the IP address) from each terminal 1 through the communication unit 28, and determines whether each terminal is a connection permitted terminal. Specifically, the display device 2 determines whether the returned terminal name agrees with a terminal name registered in the permitted connection management file 31. If it is determined that the returned terminal name agrees with the registered terminal name, the display device 2 handles the terminal 1 as a connection permitted terminal.

[0261] The terminal names and the IP addresses of the terminals 1 determined as connection permitted terminals are successively registered in the connection status management file 33. The connection status management file 33 allows the display device 2 to learn how many terminals 1 are currently connected. Since the determination of whether the connection is permitted or not is based on the terminal name, the system works even if the IP address, provided to the terminal 1 using the DHCP, becomes different each time connection is made.

[0262] The display device 2 waits on standby for any request after the above preliminary step is complete. The display screens of the four terminals 1a-1d, out of the terminals 1 operated by conference participants, are presented on a multi-window display screen 50 of the display device 2. As for the resolutions thereof, the terminal 1a has an SXGA resolution (1280x1024 pixels), the terminal 1 has an SVGA resolution (800x600 pixels), the terminal 1c has an XGA resolution (1024x768 pixels), and the terminal 1d has a resolution of 480x640 pixels.

Multi-Window Screen Presentation Function

[0263] FIG. 8 illustrates the configuration of the display system in which display screens of four terminals 1a-1d are presented on the display screen of the display device 2.

[0264] The user operates the remote controller in the input section 23 to enter an operational input to display the screens of the terminals 1a-1d. Through the user interface 24, the arithmetic unit 27 is notified of the input information, namely, a request to display the screens of the terminals 1a-1d together with identification information of the terminals 1a-1d (step S1). When the request is placed, the priority order, the partial capture, and the difference capture may be designated. Here, no particular designation is performed.

[0265] Upon receiving the display request, the arithmetic unit 27 in the display device 2 performs processes in steps S3-S9 for each of the terminals 1a-1d to be displayed (step S2). The arithmetic unit 27 references the permitted connection management file 31 and the permitted display management file 32 according to the terminal name indicated by the identification information contained in the display request, thereby determining whether or not each terminal 1 is permitted for connection and whether or not each terminal 1 is permitted for display (step S3). If it is determined that each terminal 1 is permitted for both connection and display (step S4), the arithmetic unit 27 requests, through the communication unit 28, each terminal 1 to send the terminal information (the terminal name, the IP address, the screen size, and the color count information) (step S5). The

arithmetic unit 27 receives the terminal information which has been sent in response to the request (step S6), and registers the terminal information in the display status management file 34 (step S7). If the priority order, the partial capture, and the difference capture are designated during the placement of the display request, the priority order, the capture area management flag, and the difference capture management flag are also registered in the registration in step S7.

[0266] The arithmetic unit 27 sends the display status management file 34 and a screen capture start command to the terminal 1 which is permitted for connection and display (step S8). When any terminal 1 is not permitted for connection and display, the arithmetic unit 27 sends a notification to that effect to the terminal 1 (step S9).

[0267] If all four terminals 1a-1d are permitted for connection and display, the terminal information from the terminals 1a-1d is registered in the display status management file 34 in the processes in steps S2-S9. At the same time, the screen capture start command is sent together with the display status management file 34 to each of the terminals 1a-1d through the communication unit 28.

[0268] Subsequent to the above processes, the arithmetic unit 27 notifies the window area information generator 41 in the display control unit 22 of a window area split request. The display device 2 enters a window area information generation process (step S10). The operation of the terminal 1 having received the screen capture start command will be discussed later. Discussed first is the window area information generation process performed by the window area information generator 41 in response to the window area split request.

[0269] FIG. 9 is a flow diagram illustrating the flow of a window area information generation process. The operation of the window area information generator 41 is specifically discussed on the assumption that the display status management file 34 is constructed as shown in FIG. 10. As shown in FIG. 10, terminal names PC-1, PC-2, PC-3, and PDA-1 correspond to the terminals 1a, 1b, 1c, and 1d, respectively.

[0270] Upon receiving the window area split request from the arithmetic unit 27, the window area information generator 41 learns the number of the terminals 1 to be displayed (here, four terminals 1) referencing the display status management file 34. The user interface 14 also acquires the priority order of each of the terminals 1a-1d (step S21). The window area information generator 41 references the tentative window area setting file 35 according to the number of terminals 1 and the priority order of each of the terminals 1a-1d, and acquires a tentative size and a tentative origin of each tentative window area assigned to each of the terminals 1a, 1b, 1c, and 1d (step S22). As will be clarified later, the adjective "tentative" is used because the area window here assigned to the terminal 1 is updated in a later step to size convert the captured image data.

[0271] As shown in FIG. 10, the four terminals 1 are to be displayed here and no priority order is set to all of the four terminals 1. A tentative area setting table in the tentative window area setting file 35 is organized as shown in FIG. 11A. Here, the display screen of the display 21 has a resolution of 1280x1024 (SXGA), and the tentative area setting table shown in FIG. 11A is organized based on this display screen. FIG. 11B shows the tentative window area based on the table window area setting table shown in FIG. 11A.

[0272] The priority order shown in FIG. 11A is determined based on the "priority" item in the display status management file 34, and the terminals 1 are first, second, third, and fourth in from the high order to the low order. The terminals 1 are assigned the "tentative size" and the "tentative origin" for the tentative window area in the lower table. All the terminals 1a-1d have "none" in the priority order row with no priority order set therefor (see FIG. 10). If no priority order is set, the order of assignment may be a predetermined one, or may be the order of registration to the display status management file 34. In the second preferred embodiment, the terminals 1a, 1b, 1c, and 1d (hereinafter referred to as the terminal names PC-1, PC-2, PC-3, and PDA-1 as appropriate) are assigned tentative window areas 50A, 50B, 50C, and 50D in that order.

[0273] The window area information generator 41 further acquires the screen sizes of the PC-1, PC-2, PC-3, and PDA-1 from the display status management file 34 (see FIG. 10), and determines the sizes and origins of true windows respectively assigned thereto based on the acquired screen sizes (step S23).

[0274] FIG. 12 illustrates the true window area size and the true origin. As shown, 51A, 51B, 51C, and 51D represent the true window areas assigned to the PC-1, PC-2, PC-3, and PDA-1, respectively. The captured image data to be displayed on the tentative window area is size converted with the aspect ratio thereof maintained. The true window areas are display areas of the tentative window areas 50A, 50B, 50C, and 50D in which the converted images are respectively displayed with the centers thereof aligned to be centered on the respective tentative window areas. The PC-2 is now specifically discussed in connection with the true window area size to determine the true window area. The screen size of the PC-2 is 1024x768 pixels (see FIG. 10). The image data of this size is contracted with the aspect ratio thereof (namely, the aspect ratio of the display screen of the display 11) maintained so that the image data is displayed within the window area 50B having the size of 640x512 pixels assigned to the PC-2. The contracted size is thus the true window area size. The true origin is used to place the window of that size at the center of the window area 50B as shown in FIG. 12, and is represented in pixel coordinates at the top left corner of the window (the absolute coordinates with respect to the entire display screen).

[0275] The window area information generator 41 de-

termines the above-referenced true window area sizes and true origins for the PC-1, PC-2, PC-3, and PDA-1, and generates window area information containing the terminal name item, the window area item, and the origin item as shown in FIG. 13, and then stores the window area information in the data storage 26 as the window area information file 36 (step S24). The window area information generation process thus ends. The window area information file 36 is tagged with processing date (May 21, 2002, 17:00:32, for example).

[0276] Returning to FIG. 29, the arithmetic unit 27 in the display device 2 performs processes in steps S12-S14 to each of the terminals 1a, 1b, 1c, and 1d to be displayed (step S11) when the window area information generator 41 completes the window area information generation process (step S10). More specifically, the arithmetic unit 27 places a request to send the captured image data (step S12). Each of the terminals 1a, 1b, 1c, and 1d has already started the image capture process after receiving the capture start command transmitted from the display device 2 in step S8. The captured image data acquired in the screen capture process and the image size (in the partial capture process) are sent to the display device 2 in response to the request to send the captured image data in step S11

[0277] The display device 2 receives the reply from the terminal 1 (step S13). If the rely is the captured image data, the display device 2 determines that the screen capture performed by the terminal 1 is the full-screen capture (step S14), and the received captured image data is written onto the captured image data memory 37 (step S16).

[0278] If the reply from the terminal 1 received in step S13 contains the captured image data and the image size, the arithmetic unit 27 determines the screen capture performed by the terminal 1 is a partial-screen capture (step S14). The captured image size in the display status management file 34 is updated with the received image size. The arithmetic unit 27 regenerates the window area information (the true window area size and the true origin) based on the received image size (step S15). The arithmetic unit 27 writes the received captured image data together with the image size on the captured image data memory 37 (step S16).

[0279] The above process is performed for each of the terminals 1a-1d. When the captured image data is received from the terminals 1a-1d the arithmetic unit 27 sends an image synthesis command to the image synthesizer 42. The display device 2 enters the image synthesis process (step S17).

[0280] Upon receiving the image synthesis command, the image synthesizer 42 performs the size conversion process and the color conversion process on the captured image data stored in the captured image data memory 37 based on the window area information in the window area information file 36 and the color count information in the display status management file 34. The image synthesizer 42 then the captured image data into a single screen image data, thereby generating the synthesized image data. The synthesized image data is then output to the image processor 43.

[0281] The image processor 43 converts the synthesized data from the image synthesizer 42 in display image data having a scanning frequency of the display 21. The display image data is then output to the display 21. As shown in FIG. 8, a multi-window display is thus present on the display screen 50 in which the captured image data (display screen) of the terminals 1a, 1b, 1c, and 1d is presented on the true window areas (hereinafter also referred to as window screens) of 51A, 51B, 51C, and 51D (step S18).

[0282] The operation of the terminal 1 having received the capture start command and the display status management file 34 from the display device 2 is discussed below.

[0283] FIG. 30 is a flow diagram of an operation of the terminal 1 which has received the capture start command and the display status management file 34 from the display device 2. The terminal 1 is here 1a (PC-1).

[0284] The data management processor 18 in the terminal 1a receives, through the communication unit 17, the capture start command and the display status management file 34 sent from the display device 2 (step S31). The data management processor 18 references the capture area setting flag in the terminal 1a in the display status management file 34 (step S32). Since the capture area setting flag is "0" (step S33), the full-screen capture is determined to be activated. The data management processor 18 sends a full-screen capture command to the screen capture processor 19. In response to the full-screen capture command, the screen capture processor 19 stores the content of the video memory 12 (i.e., the content currently displayed on the display screen of the display 11) in the storage 15 in a bit-map format (the full-screen capture process) (step S34). The image capture processor 19 notifies the data management processor 18 of the completion of the screen capture process.

[0285] If the capture area setting flag is "1" in step S33, a partial capture is determined to be activated. A capture area designation screen indicating a message saying "designate a capture area" is presented on the display 11 (step S35), and a partial capture command is sent to the screen capture processor 19. When the user, who reads the message on the capture area designation screen, selects a window or encloses a desired area using the input section 13, the screen capture processor 19 recognizes the user operation through the user interface 14. The image data on the video memory 12 corresponding to the designated area and the image size is stored in the storage 15 (the partial capture process) (step S36). The image capture processor 19 notifies the data management processor 18 of the completion of the screen capture process.

[0286] Upon receiving the capture start command, the terminal 1a performs the screen capture process. Mean-

while, the display device 2 performs the window area information generation process as already described. The terminal 1a sends the captured image data and the image size (in the partial capture) to the display device 2 through the communication unit 17 (step S38) after the screen capture processor 19 completes the screen capture process and the request to send the captured image data is received from the display device 2 (step S37).

[0287] The above-referenced process is similarly performed on each of the remaining terminals 1b 1c, and 1d in addition to the terminal 1a. As a result, the display device 2 receives, from each of the terminals 1a, 1b 1c, and 1d, the captured image data and the image size (in the partial capture process).

[0288] Each terminal 1 receives the display status management file 34 from the display device 2. The display status management file 34 is used to check the status of the capture area setting flag of own terminal 1. Furthermore, the content of the file may be displayed on the display 11 by performing a predetermined operation on the input section 13. The permitted connection management file 31, the permitted display management file 32, and the connection status management file 33 may also be acquired from the display device 2 as necessary to be presented on the display 11. In this way, the user may learn what terminals are displayed other than own terminal operated by the user himself and the range of authority granted to own terminal 1.

Expansion Display Function

[0289] The expansion display function for expanding any one of a plurality of currently presented windows is discussed below. The expansion display function is performed by updating the priority order in the above-referenced arrangement.

[0290] FIG. 15 diagrammatically illustrates the display system to explain the expansion display function. The screen of the terminal 1a is expanded by heightening the priority order of the terminal 1a.

[0291] The screen of the terminal 1a is designated by operating the remote controller. If the terminal 1a is assigned any key in the remote controller, the user designates the terminal 1a by pressing that key. If no particular key is assigned, the user may operate the remote controller to select the terminal 1a on a menu screen on the display 21, or may click the screen of the terminal 1a with a pointer on the display screen using the remote controller.

[0292] Designation information input in this way, i.e., the expansion display request containing the identification information of the terminal 1a, is sent to the arithmetic unit 27 through the user interface 24. The arithmetic unit 27 identifies the terminal 1a based on the identification information contained in the expansion display request. The arithmetic unit 27 sets the priority order of the terminal 1a (PC-1) in the display status management file 34 to be "highest", and sends a window area split request to the window area information generator 41.

[0293] The window area information generator 41 generates the window area information file 36 as already described. The tentative window area setting table, which is referenced in the generation of the window area information file 36, is organized as illustrated in FIG. 16A. FIG. 16B shows tentative window areas based on the tentative window area setting table. The priority order illustrated in FIG. 16B is determined based on the priority order in the display status management file 34. The priority order of the terminal 1a is higher than those of the remaining terminals 1b 1c, and 1d. The terminal 1a is thus assigned the tentative window area 52A (the window area for the first terminal) having the first priority in FIG. 16B. The assignment of the window areas to the remaining terminals 1b, 1c, and 1d having no priority order set therefor is arbitrary. For example, the terminals 1b, 1c, and 1d are now assigned the window areas 52B, 52C, and 52D, respectively. As already described, the true window areas to be assigned to the terminals 1b, 1c, and 1d are determined.

[0294] FIG. 17 illustrates the true window areas. The terminals 1a, 1b, 1c, and 1d are assigned the true window areas 53A, 53B, 53C, and 53D, respectively. The window area information file 36 is then organized as illustrated in FIG. 18.

[0295] As already described, the captured image data (display screen) of the terminals 1b, 1c, and 1d appears on the true window areas 53A, 53B, 53C, and 53D, respectively. The designated window 53A is shown in the expanded state on the multi-window screen 50 as shown in FIG 15.

Function to Switch to Single-Window Screen

[0296] One of the plurality of multi windows is shown on a single-window screen as shown in FIG. 19. The user operates the remote controller to enter an operational input for the function to switch to a single-window screen. More specifically, the arithmetic unit 27 is notified of the input information, namely, the single-window display request containing the identification information of the terminal 1c corresponding to the window 51C to be displayed on the single-window screen, through the user interface 24. The arithmetic unit 27 identifies the terminal 1c based on the identification information contained in the single-window display request. The arithmetic unit 27 sets the priority order item of the terminal 1c (PC-3) in the display status management file 34 to be the highest, thereby sending a window area split request to the window area information generator 41.

[0297] As a result, the multi-window screen is replaced with the single-window screen as shown in FIG. 19. The user may return to the multi-window screen by performing a predetermined operation on the remote controller to set the priority order to "none".

[0298] The switching to the single-window screen allows the user to recognize details, which are not visible in the contracted scale on the window. The ease of use is assured because the predetermined operation quickly returns the screen to the multi-window screen.

Insertion Function

[0299] As shown in FIG. 20, a new screen may be inserted into a currently presented multi-window screen. Such an insertion corresponds to a display request subsequent to the display of a multi-window screen. The screen insertion is thus performed in the same process as in the display request process.

Erase Function

[0300] As shown in FIG. 21, one of the plurality of currently presented windows may be erased. The user operates the remote controller to enter an operational input for the erase function. More specifically, the input information, namely, an erase request containing the identification information of the terminal 1d corresponding to the window 51D to be erased is sent to the arithmetic unit 27 through the user interface 24. The arithmetic unit 27 identifies the terminal 1d based on the identification information contained in the erase request. The arithmetic unit 27 deletes the terminal information of the terminal 1d from the display status management file 34, and sends a window area split request to the window area information generator 41. The subsequent process remains identical to the one already discussed. The window 50D designated for erasure is erased as shown in FIG. 21. The multi-window screen is reorganized so that a plurality of windows corresponding to the number of terminals subsequent to the erasure are presented. Alternatively, the window 51D designated for erasure may be merely erased.

[0301] In accordance with the second preferred embodiment, the screens respectively presented on the plurality of terminals 1 connected to the network 3 are presented on the display of the display device 2 having the multi-window screen presentation function.

[0302] Since the expansion display function, the switching function to the single-window screen, the insertion function, and the erase function are available in addition to the multi-window screen presentation function, a sophisticated display device 2 is provided.

[0303] The size conversion is performed with the aspect ratio of the captured image data maintained when a multi-window screen is presented. The display device 2 thus presents a display screen free from discordance.

[0304] Rather than updating the display screen each time the conference participant (the user) places the display request through the input section 23, the display device 2 itself updates the display screen thereof every three seconds, for example. In this case, the arithmetic unit 27 in the display device 2 controls timings, thereby performing subsequent processes as described above at regular intervals. The display screen of each terminal 1 is constantly updated.

Difference Capture Function

[0305] The full-screen capture method and the partial-screen capture method have been described. The display system 100 also provides a method in which a change in the display screen on the terminal 1 is detected and image data obtained by capturing the change only is sent.

[0306] The user operates the remote controller of the input section 23 to enter an operational input to perform a difference capture on each of the terminals 1a-1d. More specifically, the difference capture management flag in the display status management file 34 is set to be "1".

[0307] For a first cycle of process subsequent to the setting of the difference capture management flag to "1", steps S1-S18 are performed as described above to present the multi-window screen.

[0308] After the completion of the multi-window presentation, the arithmetic unit 27 in the display device 2 sends a difference capture start command together with the display status management file 34 to the terminal 1, having the difference capture management flag set to "1", through the communication unit 28 and the network 3.

[0309] The operation of the terminal 1 having received the difference capture start command and the display status management file 34 from the display device 2 will be discussed below.

[0310] FIG. 22 is a flow diagram illustrating the operation of terminal which has received the difference capture start command and the display status management file 34 from the display device 2. Here, the terminal is the terminal 1a (PC-1).

[0311] The data management processor 18 in the terminal 1a receives, through the communication unit 17, the difference capture start command and the display status management file 34 sent by the display device 2 (step S41). The terminal 1a thus performs a subsequent full-screen capture process. More specifically, the screen capture processor 19 stores the content of the video memory 12 in the storage 15 (step S42). The image data obtained here is referred to as pre-full-screen data.

[0312] The screen comparison processor 20 references the difference capture management flag in the display status management file 34, received by the data management processor 18, at any regular intervals set (once every 0.5 second, for example) (step S43). If the difference capture management flag is "1" (step S44), a subsequent difference capture operation is performed.

[0313] To quit the difference capture operation, the user simply sets the difference capture management flag to "0" in the same way the display status manage-

ment file 34 is modified. The screen comparison processor 20 determines whether or not the capture operation is suspended, by referencing the difference capture management flag.

[0314] After performing the full-screen capture process, the screen capture processor 19 stores the content of the video memory 12 in the storage 15 (step S45). The image data obtained here is referred to as post-full-screen data. The screen comparison processor 20 in the controller 16 compares the pre-full-screen data with the post-full-screen data (step S46).

[0315] A screen comparison process is discussed in which a mouse pointer is moved (see FIG. 23). The mouse pointer changes the position thereof from pre-full-screen data 60 and post-full-screen data 61. As shown in FIG. 24, two areas 70 and 71 are recognized as being changed. The screen comparison processor 20 detects a change. If it is determined that there has been a change in the screen (step S47), the screen comparison processor 20 acquires image data of an area that has undergone a change, a size of the image data (the number of pixels in vertical and horizontal directions), and coordinates of an origin of the image data (absolute coordinates within the area defined by the captured image size in the display status management file 34).

[0316] In this case, the screen comparison processor 20 acquires, with respect to the area 70, captured image data of the area 70 (hereinafter referred to difference captured image data 1), a difference captured image size 1, and a difference capture origin 1, and with respect to the area 71, captured image data of the area 71 (hereinafter referred to difference captured image data 2), a difference captured image size 2, and a difference capture origin 2. The screen comparison processor 20 then stores these pieces of information in the storage 15 while notifying the data management processor 18 that the difference captured image data has been acquired (step S48). The difference captured image size 1, the difference captured image size 2, the difference capture origin 1, and the difference capture origin 2 are written on the respective portions thereof in the display status management file 34.

[0317] The data management processor 18 sends these pieces of data to the display device 2 through the communication unit 17 and the network 3 (step S49). The difference capture function is different from the full-screen capture and the partial-screen capture. More specifically, the difference capture function is performed not in response to the request to send received from the display device 2 but in response to the change in the screen detected by the screen comparison processor 20. The transmission operation of the captured image data is then performed.

[0318] The post-full-screen data is set to be pre-full-screen data for a subsequent screen comparison process (step S50).

[0319] The display device 2 then receives the difference captured image data 1, the difference captured image data 2, and the display status management file 34 from the terminal 1a. The operation of the display device 2 subsequent to the reception of these pieces of data will now be discussed.

[0320] Upon receiving the difference captured image data 1, the difference captured image data 2, and the display status management file 34 from the terminal 1a at the communication unit 28, the arithmetic unit 27 transfers an image synthesis command to the image synthesizer 42. The display device 2 enters the image synthesis process in the difference capture function.

[0321] Upon receiving the image synthesis command, the image synthesizer 42 rewrites portions of the captured image data stored in the captured image data memory 37 corresponding to the difference captured image data 1 and the difference captured image data 2, based on the window area information file 36 corresponding to the image displayed on the display 21 and the display status management file 34 (the difference captured image size 1, the difference captured image size 2, the difference capture origin 1, and the difference capture origin 2) received from the terminal 1a. The process subsequent to this operation are identical to those in steps S17 and S18.

[0322] The amount of image data transmitted over the network 3 is smaller in the difference capture process than in the full-screen capture (or the partial-screen capture) process. The workload on the network 3 is thus reduced. The user constantly monitors an updated image of the terminal 1.

[0323] The above description of the difference capture process is based on the assumption that a dedicated program installed on the terminal 1 is used to capture the screen. If a driver for directly detecting a difference in the content of the video memory is available on the operating system (OS), such a driver may be used.

[0324] The image data may be exchanged in a compression standard format (such as JPEG) between the terminal 1 and the display device 2 to reduce the workload on the network 3.

[0325] In the above description, a variety of requests such as the display request and the single-window screen presentation request is performed by operating the input section 23 on the display device 2. In other words, the display device 2 has the initiative in the organization of the screen. Alternatively, each terminal 1 may have the initiative. The conference participant (the user) enters a desired operational input by operating the input section 13 on own terminal 1. The input information is transferred to the data management processor 18 through the user interface 14. The data management processor 18 in turn sends the request, including the terminal name and the IP address of own terminal 1, responsive to the input information to the display device 2 via the communication unit 17 and the network 3. The request is received by the communication unit 28 in the display device 2 through the network 3. The request is

then transferred to the arithmetic unit 27. The operation subsequent thereto remains the same as those already discussed. In this way, a variety of requests may be placed on the terminal 1.

[0326] The terminal 1 may designate the capture area by containing information, which designates the full-screen capture or the partial-screen capture, in the variety of requests.

[0327] The priority order may be designated by the user as necessary as described above. Alternatively, a plurality of terminals 1 which are scheduled to be connected to the display device 2 may be assigned beforehand priority order. If the terminals 1 are assigned beforehand the priority order, the priority assigned to each terminal 1 is automatically set in the priority item of the display status management file 34 when the terminal information is registered in the display status management file 34.

[0328] In the second preferred embodiment, the tentative window area is determined based on the tentative window area setting file 35. Alternatively, the tentative window area may be determined through calculation each time.

Claims

1. A display system comprising:

   a plurality of terminals, each terminal having a screen capture function, and sending image data, captured using the screen capture function, over a network; and
   a network interactive display device, including a display, receiving the captured image data transmitted from the terminal through the network, and having a multi-window screen presentation function for synthesizing the captured image data into single screen multi-window format data to be displayed on a display screen of the display,

   wherein, as processes required to present the single screen multi-window format data on the display screen of the display of the network interactive display device, the terminal performs a size conversion process of an image size of the image data captured using the screen capture function and the network interactive display device acquires the captured image data subsequent to the size conversion thereof from the terminal, and synthesizes the received captured image data.

2. A display system according to claim 1, wherein the network interactive display device divides the display screen of the display into windows of the number equal to the number of terminals to be displayed, determines a display size of the window assigned to each terminal to be displayed, and sends information of the display size to the terminal, and wherein the terminal performs the size conversion process on the image size of the captured image data to the received display size when the terminal receives the display size.

3. A display system according to claim 1, wherein, in addition to the size conversion process on the image data captured using the screen capture function, the terminal further performs a color conversion process on the captured image data in accordance with a color count of the display of the network interactive display device before sending the captured image data to the network interactive display device.

4. A display system according to claim 3, wherein the network interactive display device also sends the color count of own display to the terminal when sending the display size to the terminal, while the terminal performs the color conversion process in response to the color count received from the network interactive display device.

5. A network interactive display device connected to each of a plurality of terminals through a network, each terminal having a screen capture function, the network interactive display device comprising:

   a display;
   a communication unit for communicating in a two-way fashion with each of the terminals; and
   a display control unit,

   wherein the communication unit receives the image data which has been captured by each terminal through the screen capture function thereof, and which has been size converted to a predetermined image size by each terminal, and the display control unit has a multi-window screen presentation function for synthesizing the captured image data received by the communication unit into single screen multi-window format data to be displayed on a display screen of the display.

6. A network interactive display device according to claim 5, wherein the display control unit has an insertion function for inserting a new window into a current display screen to display the new window.

7. A network interactive display device according to one of claims 5 and 6, wherein the terminal that provides the captured image data to be displayed on the display screen of the display is selected in a two-way communication of the communication unit by one of the network interactive display device and the terminal.

8. A network interactive display device according to one of claims 5, 6 and 7, wherein the display control unit has an expansion display function for expanding a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

9. A network interactive display device according to one of claims 5, 6 and 7, wherein the display control unit has a single-window screen selection function for switching the display screen from a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display to a single-window full screen.

10. A network interactive display device according to one of claims 5, 6 and 7, wherein the display control unit has an erase function for erasing a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

11. A network interactive display device according to claim 10, wherein the predetermined window is selected by one of the network interactive display device and the terminal in a two-way communication of the communication unit thereof.

12. A network interactive display device according to one of claims 5 to 11, wherein the image captured data received from the terminal is obtained by designating the whole or a portion of the display screen of the terminal.

13. A network interactive display device according to one of claims 5 to 11, wherein the captured image data received from the terminal is obtained by detecting and capturing only a change on the display screen of the terminal.

14. A network interactive display device according to one of claims 5 to 13, further comprising a display size determining unit that divides the display screen of the display into windows of the number equal to the number of terminals to be displayed, and determines a display size of the window to which the terminal to be displayed is assigned, and a controller that sends the display size determined by the display size determining unit to the corresponding terminal through the communication unit, wherein the controller receives, through the communication unit, the captured image data, having the converted size equal to the display size of the window assigned to the terminal, from the terminal to which the display size is sent, and controls the display control unit to synthesize the received captured image data into single screen multi-window format data to be displayed on the display screen of the display.

15. A network interactive display device according to claim 14, wherein an aspect ratio of the window assigned to the terminal to be displayed is equalized to an aspect ratio of the display screen of the display of the terminal.

16. A network interactive display device according to one of claims 5 to 15, wherein, through the communication unit, the controller also sends a display color count of the display to the terminal when sending the display size to the terminal, and receives the captured image data having the converted size equal to the display size of the window assigned to the terminal and having the display color count converted to the display color count of the display of the network interactive display device, from the terminal to which the display size and the display color count have been sent, and controls the display control unit to synthesize the received captured image data into single screen multi-window format data to be displayed on the display screen of the display.

17. A terminal connected to a network interactive display device according to one of claims 5 to 16 a network, the terminal comprising:

a display;
a communication unit that communicates in a two-way fashion with the network interactive display device;
a screen capture processor that captures the content displayed on the display screen of the display;
an image converter which converts the image data captured by the screen capture processor to data of a predetermined image size; and
a controller that sends the captured image data, size converted by the image converter, from the communication unit to the network interactive display device,

wherein the terminal generates the captured image data that is to be displayed on one of the multi windows displayed on the display screen of a display of the network interactive display device.

18. A terminal according to claim 17, wherein the display screen of the display of the network interactive display device is divided into windows of the number equal to the number of terminals to be displayed, a display size of the window assigned to each terminal to be displayed is determined, and the image converter converts the image data captured by the screen capture processor to data of the display size assigned to own terminal.

19. A terminal according to one of claims 17 and 18, wherein the image converter performs a color conversion process on the captured image data to match the display color count of the display of the network interactive display device in addition to the size conversion process, and the controller sends the captured image data, which has been subjected to the size conversion process and the color conversion process, from the communication unit to the network interactive display device.

20. A network interactive display device connected to each of a plurality of terminals through a network, each terminal having a screen capture function, the network interactive display device comprising:

a display;
a communication unit for communicating in a two-way fashion with each of the terminals; and
a display control unit,

wherein the display control unit has a multi-window screen presentation function for synthesizing the captured image data, captured by each terminal through the screen capture function and received by the communication unit, into single screen multi-window format data to be displayed on display screen of the display of the network interactive display device.

21. A network interactive display device according to claim 20, wherein the display control unit has an insertion function for inserting a new window into a current display screen to display the new window.

22. A network interactive display device according to one of claims 20 and 21, wherein the terminal that provides the captured image data to be displayed on the display screen of the display is selected in a two-way communication of the communication unit by one of the network interactive display device and the terminal.

23. A network interactive display device according to one of claims 20, 21 and 22 wherein the display control unit has an expansion display function for expanding a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

24. A network interactive display device according to one of claims 20, 21 and 22, wherein the display control unit has a single-window screen selection function for switching the display screen from a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display to a single-window full screen.

25. A network interactive display device according to one of claims 20, 21 and 22, wherein the display control unit has an erase function for erasing a predetermined window from among a plurality of windows forming a multi-window screen displayed on the display screen of the display.

26. A network interactive display device according to claim 25, wherein the predetermined window is selected by one of the network interactive display device and the terminal in a two-way communication of the communication unit thereof.

27. A network interactive display device according to one of claims 20 to 26, wherein the captured image data received from the terminal is obtained by designating the whole or a portion of the display screen of the terminal.

28. A network interactive display device according to one of claims 20 to 26, wherein the captured image data received from the terminal is obtained by detecting and capturing only a change on the display screen of the terminal.

29. A network interactive display device according to one of claims 20 to 28, wherein the display control unit comprises a window area information generator which divides the display screen of the display into windows of the number equal to the number of terminals to be displayed, and generates window area information containing a display size of the window to which the terminal to be displayed is assigned, and information identifying a display position of the window, an image synthesizer which synthesizes the captured image data from the terminals into single screen multi-window format data in accordance with the window area information generated by the window area information generator, thereby generating synthesized image data, and an image processor which processes the synthesized image data generated by the image synthesizer, thereby generating display image data and outputting the display image data to the display.

30. A network interactive display device according to claim 29, wherein the image synthesizer synthesizes the captured image data by contracting or expanding the captured image data from each terminal with an aspect ratio of the image size of the captured image data maintained.

FIG. 1

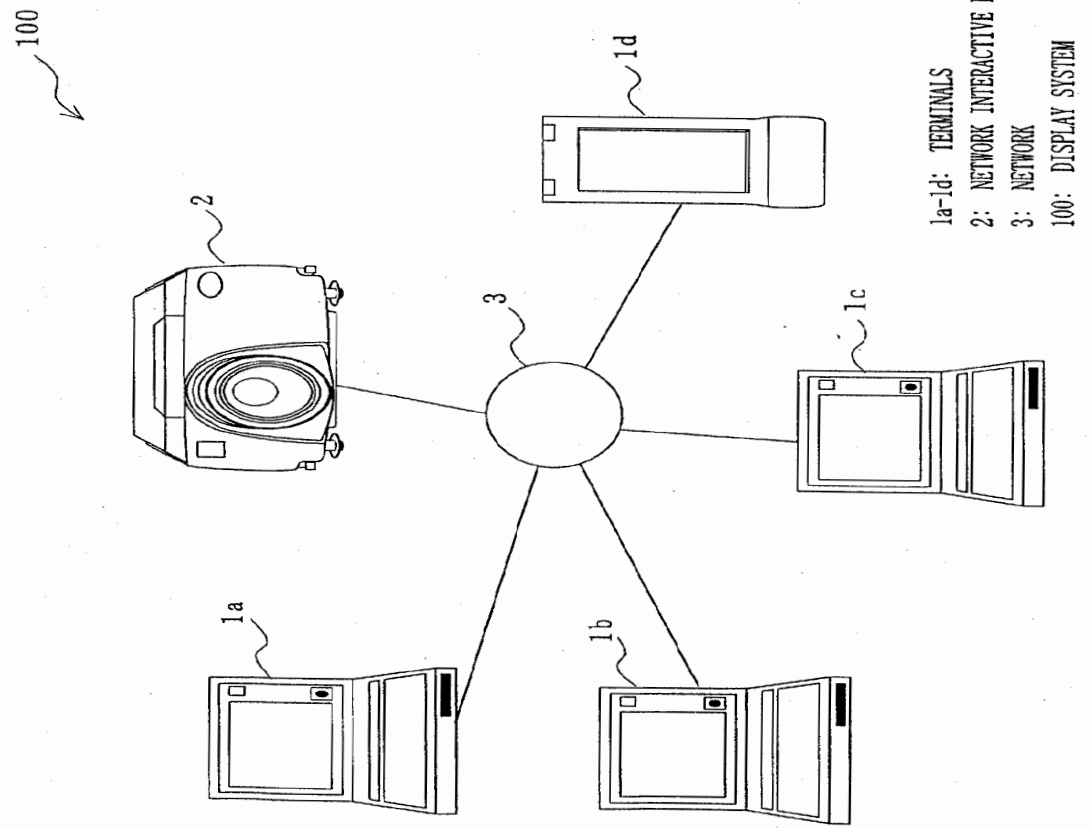

100
2
1d
3
1c
1a
1b
1a-1d: TERMINALS
2: NETWORK INTERACTIVE DISPLAY DEVICE
3: NETWORK
100: DISPLAY SYSTEM

FIG. 2

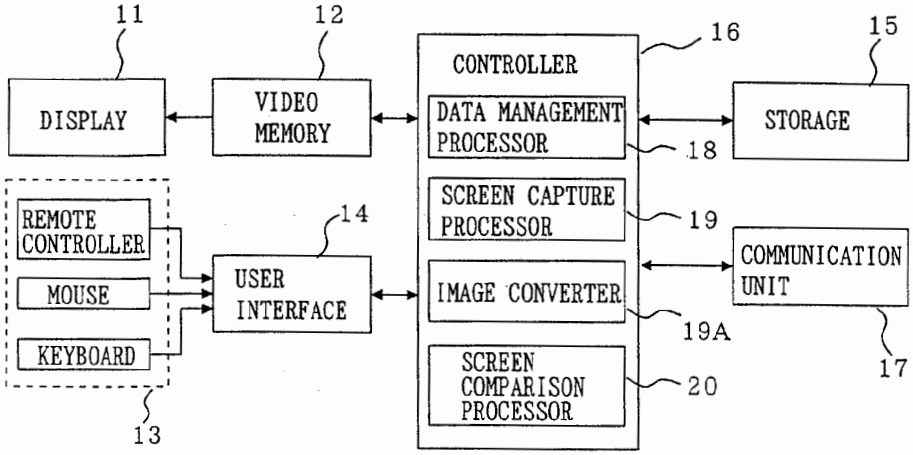

11
12
16
15
DISPLAY
VIDEO MEMORY
CONTROLLER
DATA MANAGEMENT PROCESSOR
18
STORAGE
SCREEN CAPTURE PROCESSOR
19
REMOTE CONTROLLER
14
MOUSE
USER INTERFACE
IMAGE CONVERTER
COMMUNICATION UNIT
19A
KEYBOARD
SCREEN COMPARISON PROCESSOR
20
17
13

FIG. 3

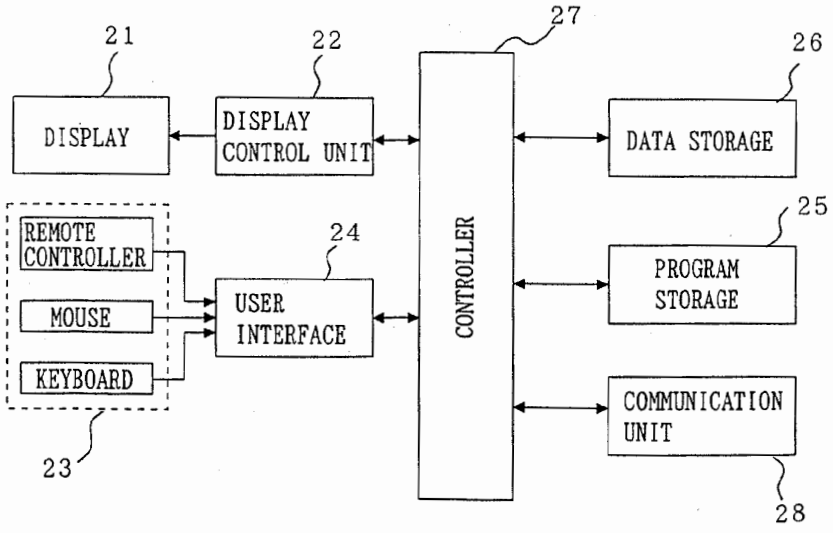
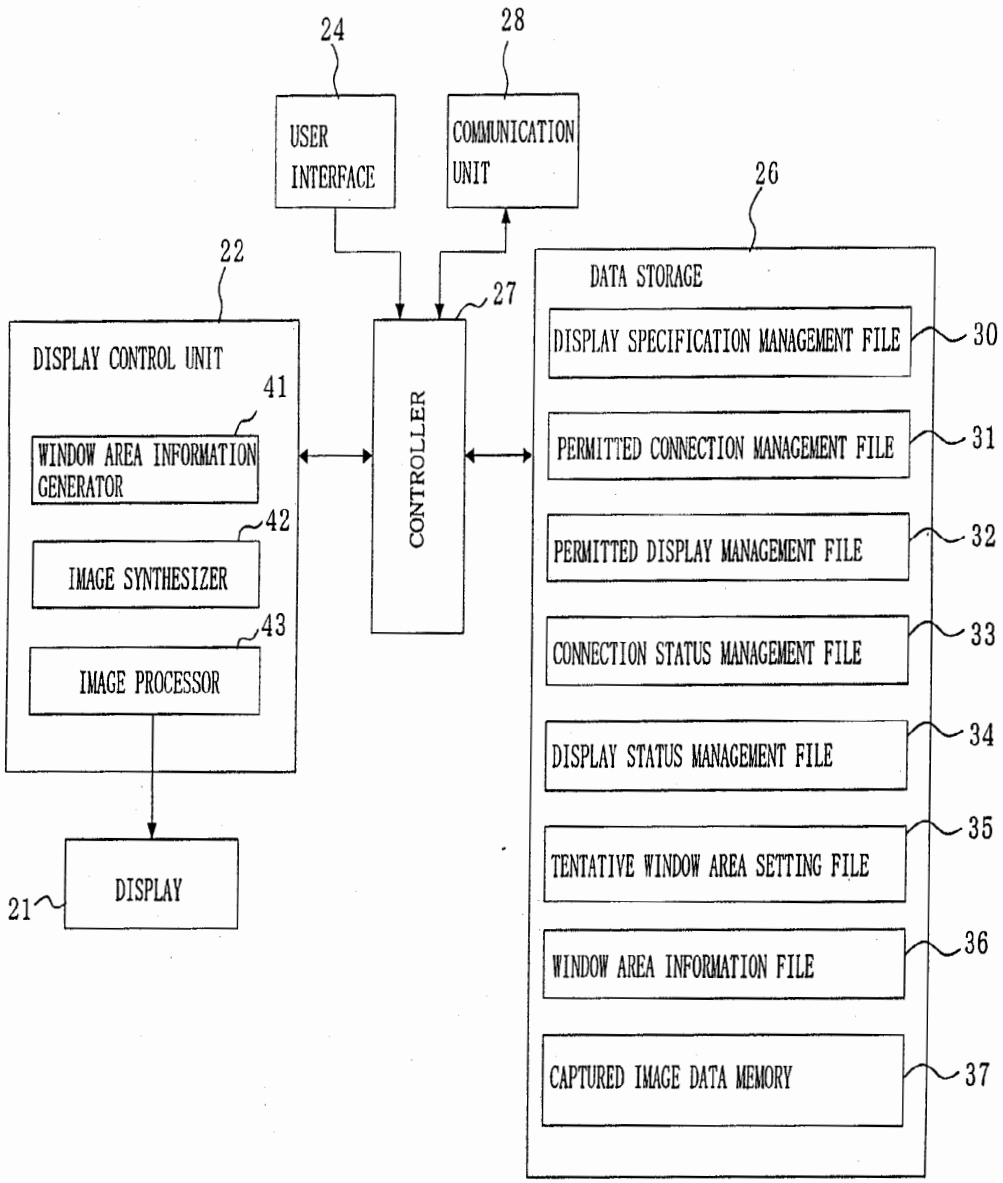
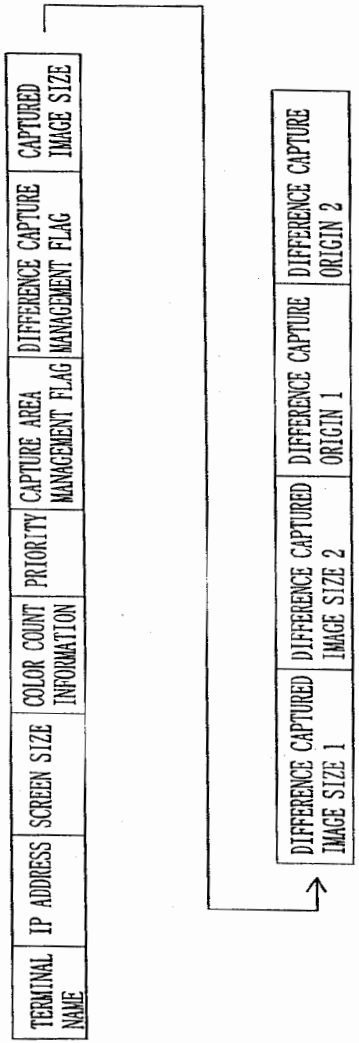

21
22
27
26
DISPLAY
DISPLAY CONTROL UNIT
DATA STORAGE
25
REMOTE CONTROLLER
24
PROGRAM STORAGE
MOUSE
USER INTERFACE
CONTROLLER
KEYBOARD
COMMUNICATION UNIT
23
28

FIG. 4


24
28
USER INTERFACE
COMMUNICATION UNIT
26
22
DATA STORAGE
27
DISPLAY CONTROL UNIT
DISPLAY SPECIFICATION MANAGEMENT FILE
30
41
CONTROLLER
WINDOW AREA INFORMATION GENERATOR
PERMITTED CONNECTION MANAGEMENT FILE
31
42
IMAGE SYNTHESIZER
PERMITTED DISPLAY MANAGEMENT FILE
32
43
IMAGE PROCESSOR
CONNECTION STATUS MANAGEMENT FILE
33
DISPLAY STATUS MANAGEMENT FILE
34
DISPLAY
21
TENTATIVE WINDOW AREA SETTING FILE
35
WINDOW AREA INFORMATION FILE
36
CAPTURED IMAGE DATA MEMORY
37

31

FIG. 5


TERMINAL NAME
IP ADDRESS
SCREEN SIZE
COLOR COUNT INFORMATION
PRIORITY
CAPTURE AREA MANAGEMENT FLAG
DIFFERENCE CAPTURE MANAGEMENT FLAG
CAPTURED IMAGE SIZE
DIFFERENCE CAPTURED IMAGE SIZE 1
DIFFERENCE CAPTURED IMAGE SIZE 2
DIFFERENCE CAPTURE ORIGIN 1
DIFFERENCE CAPTURE ORIGIN 2