

Cellco Partnership d/b/a Verizon Wireless v. General Access Solutions

Petitioner's Demonstratives

IPR 2023-00978

U.S. Patent No. 7,230,931



Exhibit 1034

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Instituted Grounds

- **Ground 1:** Claims 28 and 29 – Obvious over Vornefeld (Ex. 1004) and Atsuta (Ex. 1005)
- **Ground 2:** Claims 28 and 29 – Obvious over Vornefeld and Goldberg (Ex. 1006)
- **Ground 3:** Claims 28 and 29 – Obvious over Youssefmir (Ex. 1007) and Atsuta
- **Ground 4:** Claims 28 and 29 – Obvious over Vornefeld, Atsuta, and Tangemann (Ex. 1008)
- **Ground 5:** Claims 28 and 29 – Obvious over Vornefeld, Goldberg, and Tangemann

Roadmap

- The Challenged Claims
 - Challenged claims 28 and 29 depend from previously cancelled claims 1 and 19
- The Sprint IPR
- Disputed Issues with Respect to the Instituted Grounds

Claims 28 and 29 of the '931 Patent

1. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a transceiver associated with a first of said plurality of base stations comprising:

transmit path circuitry associated with a beam forming network capable of transmitting directed scanning beam signals each directed to substantially only wireless access devices within a different one of a plurality of sectors of a cell site associated with said first base station, wherein said transmit path circuitry transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors, the broadcast beam signal comprising a start of frame field, and subsequently transmits, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices within one of said sectors using one of said directed scanning beam signals.

28. The transceiver as set forth in claim 1 wherein said transmit path circuitry transmits, in said downlink portion of said TDD frame, second downlink data traffic to substantially only wireless access devices within an other of said sectors using an other of said directed scanning beam signals.

19. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a method of communicating with a first of said plurality of base stations comprising the steps of:

transmitting, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of a plurality of sectors within said associated cell site, the broadcast beam signal comprising a start of frame field capable of synchronizing receivers in said wireless access devices; and

transmitting, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices in a first of said sectors using a first directed scanning beam signal.

29. The method as set forth in claim 19, further comprising:

transmitting, in said downlink portion of said TDD frame, second downlink data traffic to substantially only wireless access devices in a second of said sectors using a second directed scanning beam signal.

General Access Conceded Claims 1 and 19 Are Anticipated By Vornefeld

1. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a transceiver associated with a first of said plurality of base stations comprising:

transmit path circuitry associated with a beam forming network capable of transmitting a directed scanning beam signal to wireless access devices within one of said sectors; and
transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors, the broadcast beam signal comprising a start of frame field, and
subsequently transmits, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices within one of said sectors using one of said directed scanning beam signals.

28. The transceiver as set forth in claim 1 wherein said transmit path circuitry transmits, in said downlink portion of said TDD frame, second downlink data traffic to substantially only wireless access devices within an other of said sectors using an other of said directed scanning beam signals.

19. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a method of communicating with a first of said plurality of base stations comprising the

transmitting, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices in a first of said sectors using a first directed scanning beam signal; and
transmitting, in a downlink portion of said TDD frame, second downlink data traffic to substantially only wireless access devices in a second of said sectors using a second directed scanning beam signal.

29. The method as set forth in claim 19, further comprising:
transmitting, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices in a first of said sectors using a first directed scanning beam signal; and
transmitting, in a downlink portion of said TDD frame, second downlink data traffic to substantially only wireless access devices in a second of said sectors using a second directed scanning beam signal.

ANTICIPATED BY VORNEFELD

The Sprint IPR: Claims 1 and 19 Unpatentable

- In 2017, Sprint challenged all claims of the '931 patent.
- Sprint challenged claims 28 and 29 on three grounds, but relied on just one (anticipation):
 - Sprint's grounds:
 - Anticipated by Vornefeld
 - Obvious by Vornefeld and Andersson
 - Obvious by Newman, Ahy and Andersson
 - Sprint relied only on Vornefeld for the added limitations of claims 28 and 29, so the Board only considered whether Vornefeld met claims 28 and 29. IPR2017-01889, Paper 43 (FWD) at 24.
- The Board found that claims 1, 10, 19 were conceded to be anticipated, but that the remaining claims were not shown to be unpatentable.
- On appeal, the Federal Circuit affirmed for claims 28 and 29 but remanded the remaining claims.
- On remand, the Board found the remaining claims unpatentable, leaving only claims 28 and 29 alive.

The Sprint IPR: Claims 1 and 19 Unpatentable

General Access Conceded Vornefeld Anticipates Claims 1 and 19

- “I’m not disputing that Petitioner has provided good evidence the independent claims are not valid. We conceded that.” Ex. 1015, 56:19–57:21.
- “[Y]ou asked if a broadcast beam signal was shown in Vornefeld. We concede that it is.” Ex. 1015, 57:1–2.
- “[Vornefeld] knocks out our independent claims. We concede that.” Ex. 1015, 57:9.

The Patent Office Found Claims 1 and 19 Unpatentable

- “Patent Owner conceded the unpatentability of independent claims 1, 10, and 19.” Ex. 1009, 7.
- “[W]e enter **adverse judgment** against Patent Owner with respect to claims 1, 10, and 19.” Ex. 1009, 31 (emphasis added).

General Access is Bound By the Adverse Judgment on Claims 1 and 19

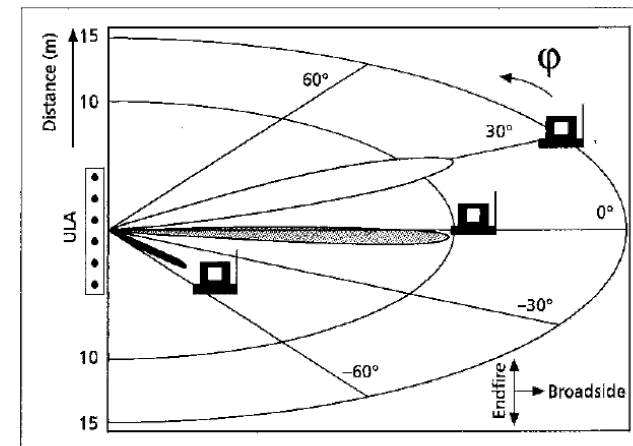
- “A patent applicant or owner is precluded from taking action inconsistent with the adverse judgement.” 37 C.F.R. § 42.73(d)(3).

Vornefeld Anticipates Claim 1

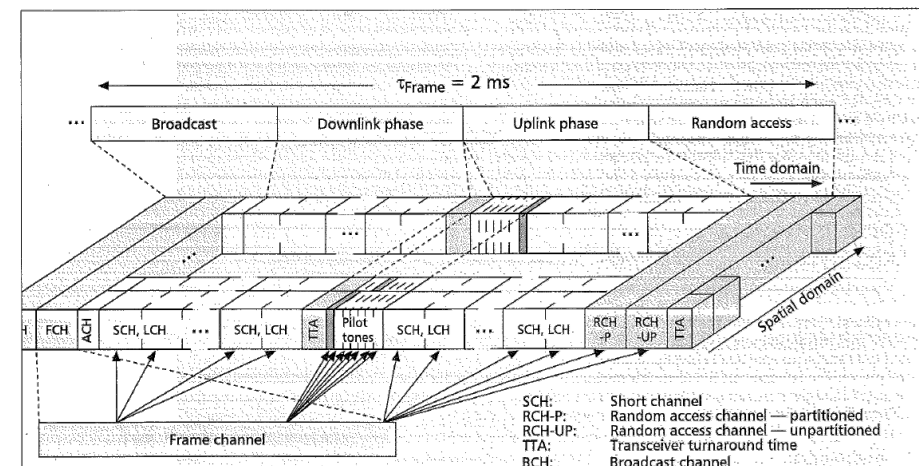
'931 Patent Claim 1

1. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a transceiver associated with a first of said plurality of base stations comprising:

transmit path circuitry associated with a beam forming network capable of transmitting directed scanning beam signals each directed to substantially only wireless access devices within a different one of a plurality of sectors of a cell site associated with said first base station, wherein said transmit path circuitry transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors, the broadcast beam signal comprising a start of frame field, and subsequently transmits, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices within one of said sectors using one of said directed scanning beam signals.



■ Figure 2. Simultaneous transmission using directive beams.



■ Figure 3. The basic frame structure of the spatially extended MAC protocol.

- TDD: Same frequency for up- and downlink; gathered uplink channel information supports downlink beamforming.

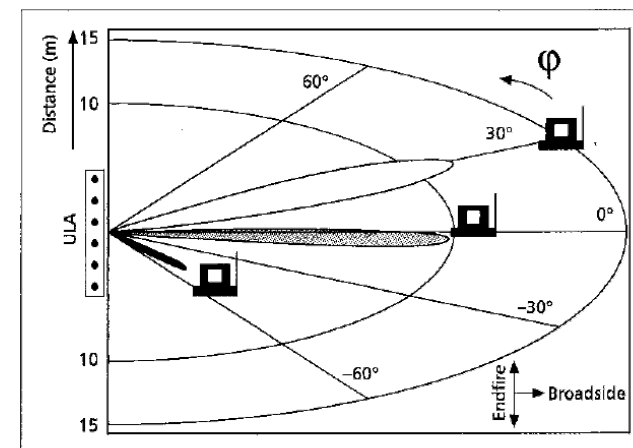
BCH — Conveys signaling information concerning the whole radio cell in the downlink direction. Announces the location of the FCH and RCH within the actual MAC frame. Every frame starts with a BCH.

Vornefeld Anticipates Claim 1

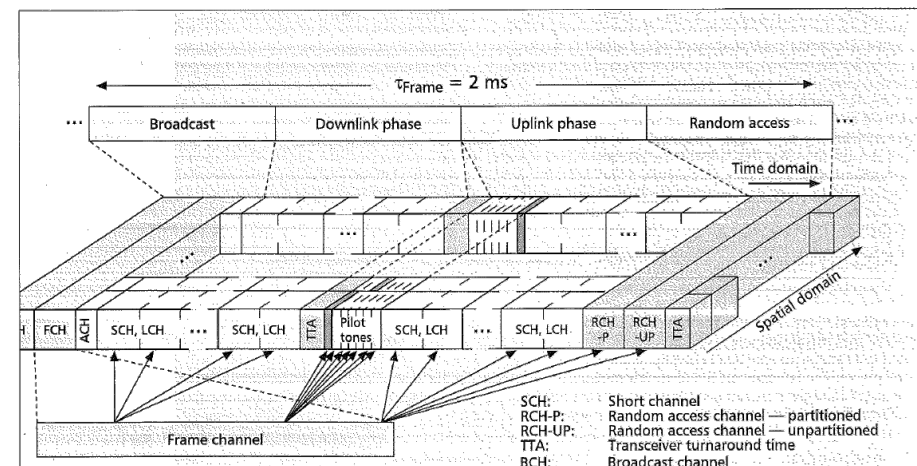
'931 Patent Claim 1

1. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a transceiver associated with a first of said plurality of base stations comprising:

transmit path circuitry associated with a beam forming network capable of transmitting directed scanning beam signals each directed to substantially only wireless access devices within a different one of a plurality of sectors of a cell site associated with said first base station, wherein said transmit path circuitry transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors, the broadcast beam signal comprising a start of frame field, and subsequently transmits, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices within one of said sectors using one of said directed scanning beam signals.



■ Figure 2. Simultaneous transmission using directive beams.



■ Figure 3. The basic frame structure of the spatially extended MAC protocol.

• **TDD:** Same frequency for up- and downlink; gathered uplink channel information supports downlink beamforming.

BCH — Conveys signaling information concerning the whole radio cell in the downlink direction. Announces the location of the FCH and RCH within the actual MAC frame. Every frame starts with a BCH.

Vornefeld Anticipates Claim 1

'931 Patent Claim 1

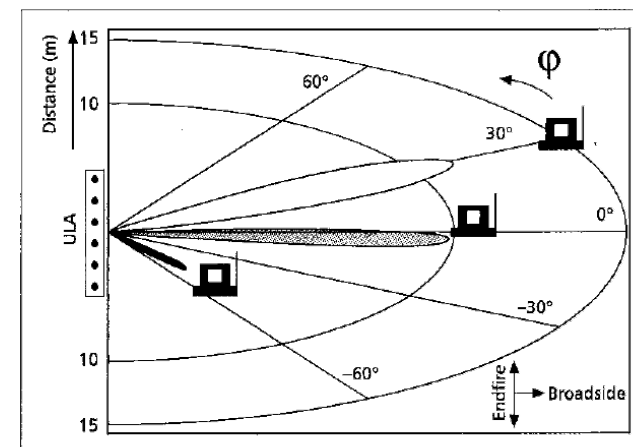
1. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a transceiver associated with a first of said plurality of base stations comprising:

transmit path circuitry associated with a beam forming network capable of transmitting directed scanning beam signals each directed to substantially only wireless access devices within a different one of a plurality of sectors of a cell site associated with said first base station, wherein said transmit path circuitry

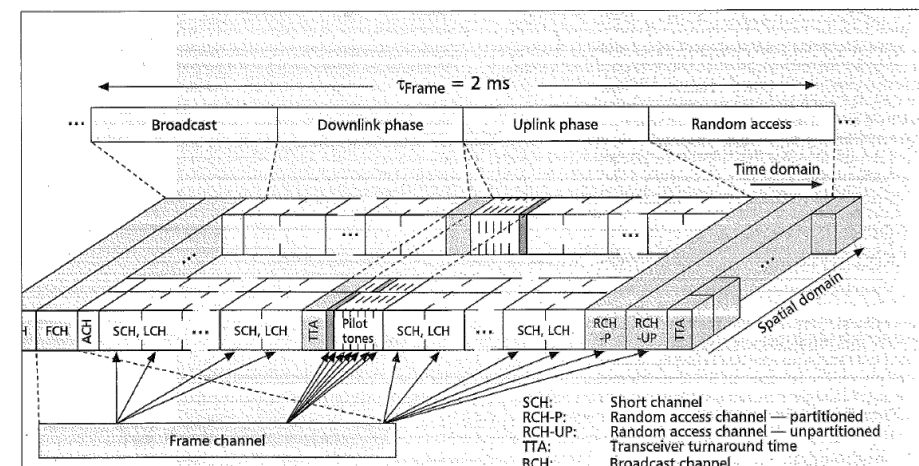
transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors, the broadcast beam signal comprising a start of frame field, and

subsequently transmits, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices within one of said sectors using one of said directed scanning beam signals.

S



■ Figure 2. Simultaneous transmission using directive beams.



■ Figure 3. The basic frame structure of the spatially extended MAC protocol.

- TDD: Same frequency for up- and downlink; gathered uplink channel information supports downlink beamforming.

BCH — Conveys signaling information concerning the whole radio cell in the downlink direction. Announces the location of the FCH and RCH within the actual MAC frame. Every frame starts with a BCH.

Vornefeld Anticipates Claim 1

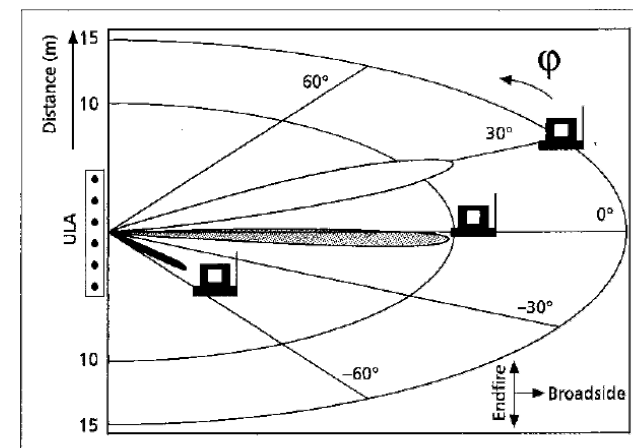
'931 Patent Claim 1

1. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a transceiver associated with a first of said plurality of base stations comprising:

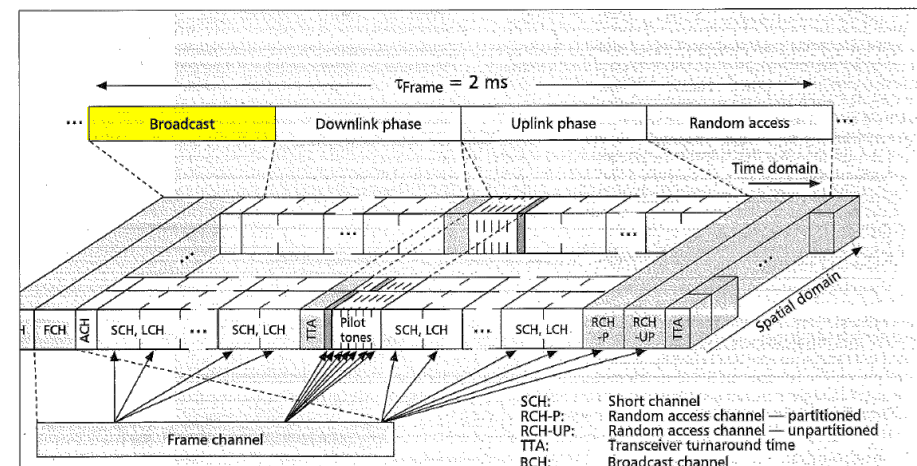
transmit path circuitry associated with a beam forming network capable of transmitting directed scanning beam signals each directed to substantially only wireless access devices within a different one of a plurality of sectors of a cell site associated with said first base station, wherein said transmit path circuitry

transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors, the broadcast beam signal comprising a start of frame field, and

subsequently transmits, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices within one of said sectors using one of said directed scanning beam signals.



■ Figure 2. Simultaneous transmission using directive beams.



■ Figure 3. The basic frame structure of the spatially extended MAC protocol.

- TDD: Same frequency for up- and downlink; gathered uplink channel information supports downlink beamforming.

BCH — Conveys signaling information concerning the whole radio cell in the downlink direction. Announces the location of the FCH and RCH within the actual MAC frame. Every frame starts with a BCH.

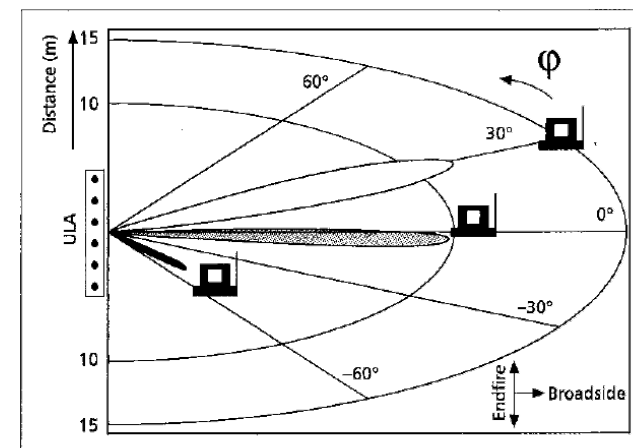
Vornefeld Anticipates Claim 1

'931 Patent Claim 1

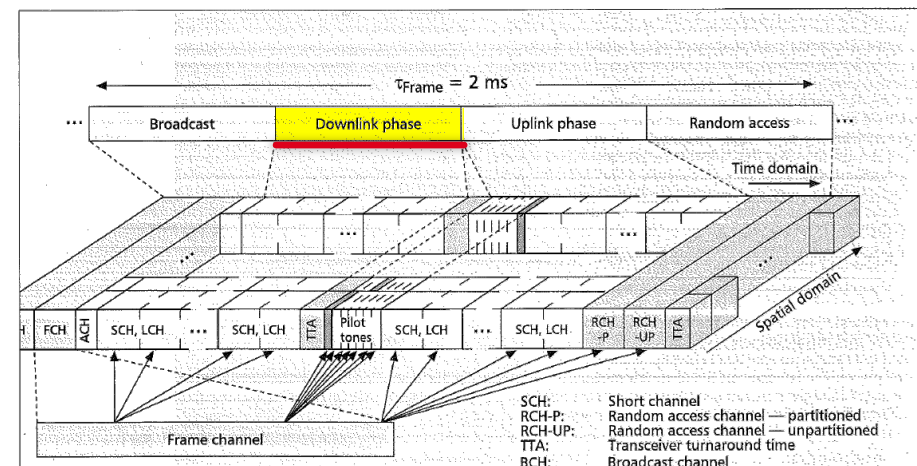
1. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a transceiver associated with a first of said plurality of base stations comprising:

transmit path circuitry associated with a beam forming network capable of transmitting directed scanning beam signals each directed to substantially only wireless access devices within a different one of a plurality of sectors of a cell site associated with said first base station, wherein said transmit path circuitry transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors, the broadcast beam signal comprising a start of frame field, and

subsequently transmits, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices within one of said sectors using one of said directed scanning beam signals.



■ Figure 2. Simultaneous transmission using directive beams.



■ Figure 3. The basic frame structure of the spatially extended MAC protocol.

- TDD: Same frequency for up- and downlink; gathered uplink channel information supports downlink beamforming.

BCH — Conveys signaling information concerning the whole radio cell in the downlink direction. Announces the location of the FCH and RCH within the actual MAC frame. Every frame starts with a BCH.

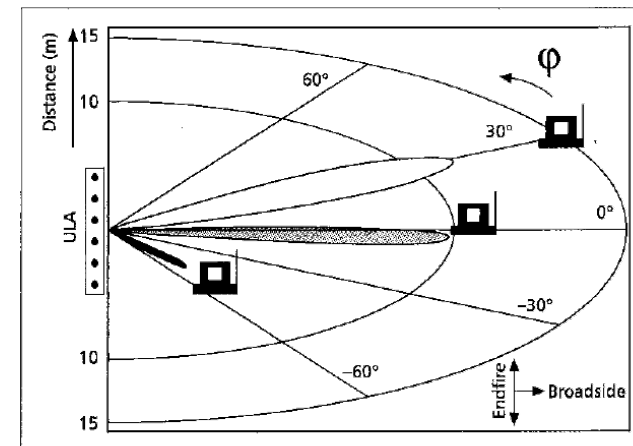
Vornefeld Anticipates Claim 19

'931 Patent Claim 19

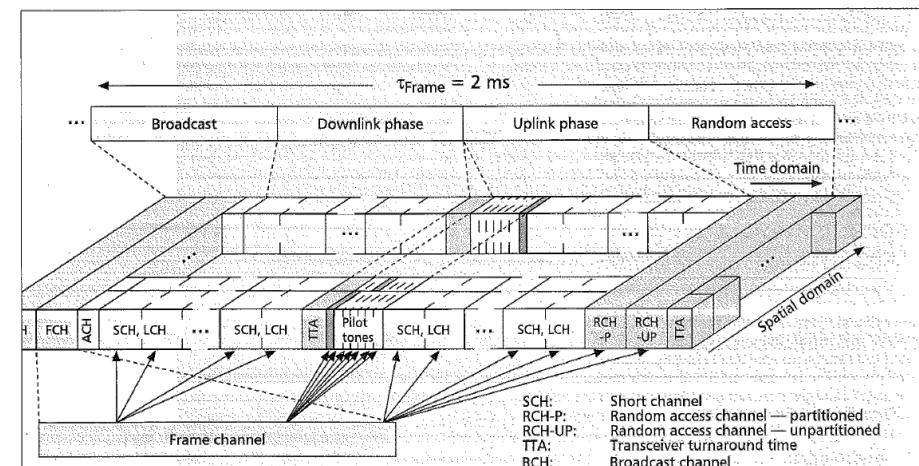
19. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a method of communicating with a first of said plurality of base stations comprising the steps of:

transmitting, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of a plurality of sectors within said associated cell site, the broadcast beam signal comprising a start of frame field capable of synchronizing receivers in said wireless access devices; and

transmitting, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices in a first of said sectors using a first directed scanning beam signal.



■ Figure 2. Simultaneous transmission using directive beams.



■ Figure 3. The basic frame structure of the spatially extended MAC protocol.

- TDD: Same frequency for up- and downlink; gathered uplink channel information supports downlink beamforming.

BCH — Conveys signaling information concerning the whole radio cell in the downlink direction. Announces the location of the FCH and RCH within the actual MAC frame. Every frame starts with a BCH.

The Sprint IPR: Claims 1 and 19 Unpatentable

The Board found that Sprint did not meet its burden to show that Vornefeld disclosed Claims 28 and 29:

domain). We agree with Patent Owner that Petitioner does not establish Vornefeld discloses using different beams in the same TDD frame (i.e., second downlink data traffic, transmitted in “said downlink portion of said TDD frame”) to transmit to devices within a different sector.

Ex. 1009 at 23

The Sprint IPR: Claims 1 and 19 Unpatentable

The Federal Circuit Affirmed, Based on “Said Downlink Portion of Said TDD Frame”

“The Board rejected Sprint's view, finding instead that Figure 3 of Vornefeld **discloses *multiple spatially separated frames that are simultaneously transmitted in parallel—not a single frame*** with ‘second downlink data traffic,’ as required by claims 28 and 29.

* * *

The depiction of components in parallel in the spatial domain could illustrate to an ordinarily skilled artisan that **multiple frames** are sent simultaneously to different locations in three-dimensional space.

* * *

These disclosures support the Board's interpretation of Figure 3 as one in which the parallel lines represent spatially **separated frames** sent simultaneously—**not components of one large frame**, as Sprint proposes. Because the Board's understanding of Figure 3 of Vornefeld is reasonable in view of these disclosures, it is supported by substantial evidence.”

Sprint Spectrum L.P. v. Gen. Access Sols., Ltd., 812 F. App'x 999, 1006–1007 (Fed. Cir. 2020)

Challenged Claims 28 and 29 Add Very Little

28. The transceiver as set forth in claim 1 wherein said transmit path circuitry transmits, in said downlink portion of said TDD frame, second downlink data traffic to substantially only wireless access devices within an other of said sectors using an other of said directed scanning beam signals.

29. The method as set forth in claim 19, further comprising:
transmitting, in said downlink portion of said TDD frame, second downlink data traffic to substantially only wireless access devices in a second of said sectors using a second directed scanning beam signal.

- The simple question presented in this Petition is whether the requirement of *using two beams to different sectors in the same frame* would be obvious.

GAS Argued at Trial That a TDD Frame Is Nothing More Than a Common Timetable

GAS's Trial Statements

- "[T]hey use something called TDD frame. So frame is like a timetable, so it designs a schedule for the transmission." Ex. 1028, 366:15–24.
- "The secret sauce is the TDD frame. The TDD frame is the common timetable that essentially delineates when certain things happen." Ex. 1028, 370:10–16.
- "[T]he TDD frame is just a schedule." Ex. 1028, 375:7-10, 506:1–6.
- "TDD frame ... is the schedule or common timetable ... carried out by the base station across all sectors." Ex. 1028, 416:10-12.
- "As I said, the TDD frame is a schedule." Ex. 1028, 475:23–476:3.

GAS's IPR Expert Concurs

- "Frame is such a broad term within communications" and the "'931 patent [provides] examples of frames." Ex. 1024, 13:3-14:15.

Ground 1: Vornefeld and Atsuta

Only Two Disputed Issues For This Ground

1. Whether Atsuta needs to disclose claim limitations already disclosed by Vornefeld.
2. Whether a POSA would have combined Atsuta's teaching of a multi-sector TDMA frame with Vornefeld's TDMA frame.

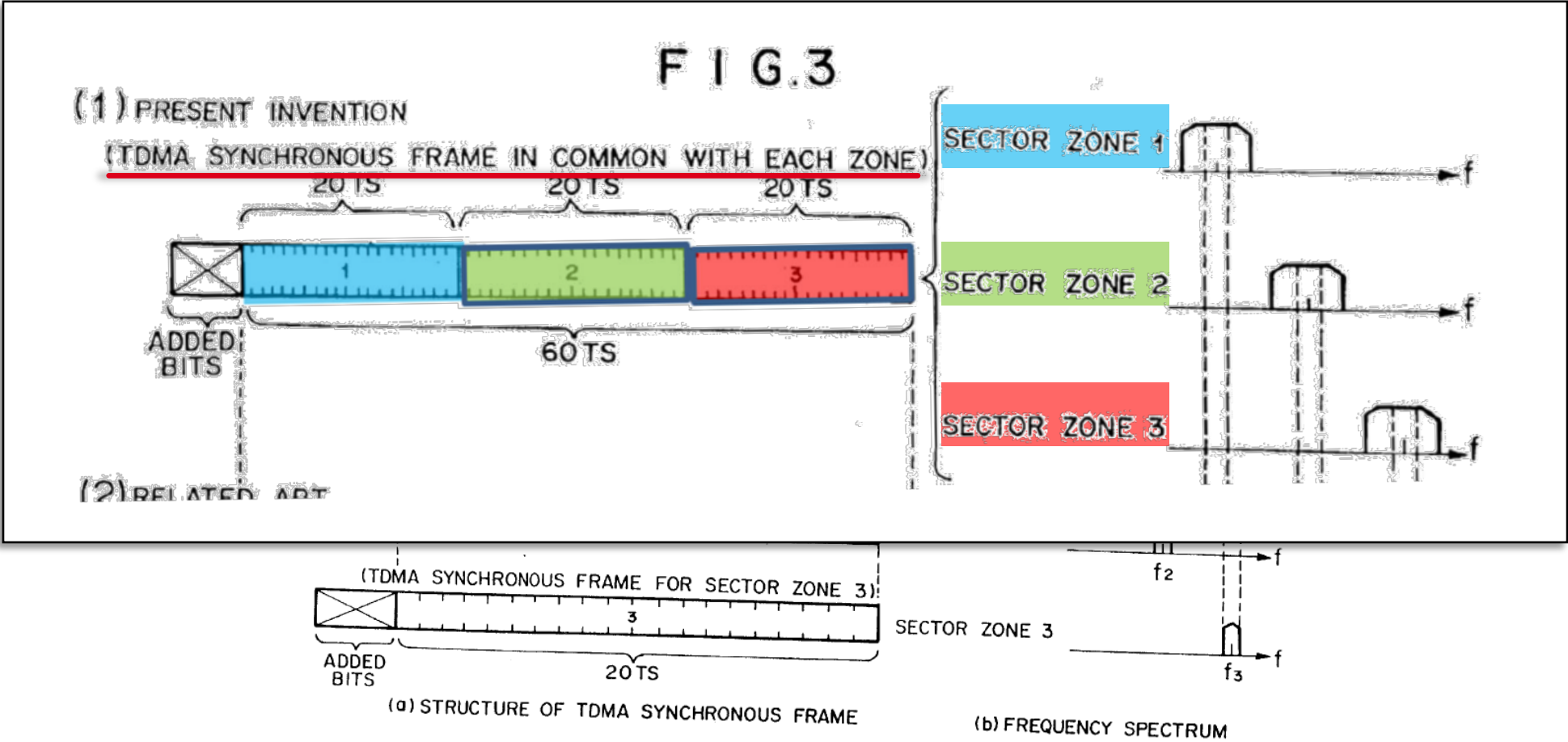
Ground 1: Vornefeld and Atsuta

Issues Not in Dispute

- **Vornefeld teaches each and every limitation of claims 1 and 19, including:**
 - “a TDD frame”;
 - “a broadcast beam signal to wireless devices within more than one of said sectors”;
 - “the broadcast beam signal comprising a start of frame field capable of synchronizing receivers”; and
 - “in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices within one of said sectors using one of said directed scanning beam signals.” Ex. 1015, 56:1–57:9.
- **Atsuta teaches combining signals for multiple sectors into a single frame.** Ex. 1024, 169:14-170:5.
- **Both Vornefeld and Atsuta disclose TDMA frames.** Ex. 1024, 79:7-14, 69:9-70:17; 97:11-101:9; Ex. 2028, ¶¶77; POR, 33.

Ground 1: Vornefeld and Atsuta

Atsuta Teaches Combining Multiple Sectors Into A Single TDMA Frame

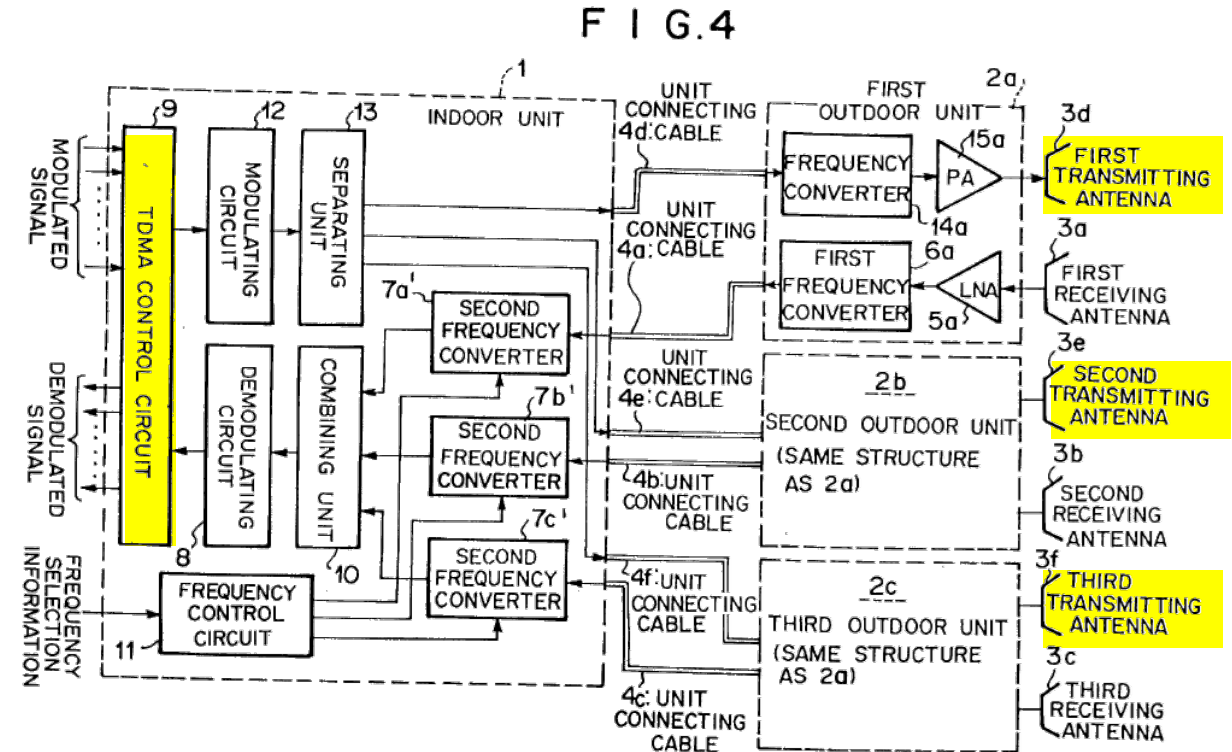


Ex. 1005, Fig. 3 (annotated)

Ground 1: Vornefeld and Atsuta

Atsuta Combines Downlink Transmissions to Different Sectors into One Frame

- “As with the TDMA control circuit shown in Fig. 2, the TDMA control circuit 9 shown in Fig. 4 obtains information signals of subscriber stations of **three fan-shaped divided zones** from a demodulated signal sent from a demodulating circuit 8. In addition, the TDMA control circuit 9 shown in Fig. 4 receives a plurality modulated signals to be **transmitted to the subscriber stations**, arranges these signals into **one signal sequence as a predetermined synchronous frame** in the TDMA method, and outputs the resultant signal sequence to the modulating circuit 12.” Ex. 1005, Fig. 4, 6:30-40.



Ex. 1005, Fig. 4 (annotated)

Ground 1: Vornefeld and Atsuta

Motivation to Combine: Hardware Simplification

Atsuta Would Simplify Vornefeld's Hardware Requirements

- "An object of the present invention is to share the same functional circuit so as to **simplify the structure** [of] the entire apparatus and **reduce the size and power consumption** of the system." Ex. 1005, 2:60-3:8 (emphasis added).
- "As a result of the present invention, . . . the demodulating circuit and the TDMA control circuit can be shared. Thus, **the size of the receiving apparatus can be reduced and thereby the power consumption can be decreased.**" Ex. 1005, 3:58-62.

Verizon's Expert Opined That This Is An Obvious Design Choice

- "Because Vornefeld recognized the need to split up transmissions on the time axis, and Atsuta teaches that technique by transmitting to different subscribers (in different sectors) in a single frame, with the benefit of simplified hardware, a POSA would have found the ... [combination] to be an obvious design choice." Ex. 1002, ¶ 95.

Ground 1: Vornefeld and Atsuta

Motivation to Combine: Both Atsuta and Vornefeld Use TDMA Frames

Atsuta

The present invention is a time division multiple access (TDMA) communicating method for performing time division multiple access for one-point-to-many-point communication between a base station and a plurality of subscriber stations with radio frequencies corresponding to zones.

Ex. 1005, 2:64-3:1

Vornefeld

protocol. In the following, we describe and evaluate concepts for a joint TDMA-SDMA approach in the context of HIPER-LAN/2, which is supported by the following system characteristics: cy channel. Multiple access is realized as time-division multiple access (TDMA). The following system-oriented discussion

Ex. 1004, 52, 53

'931 Patent

FIG. 3 illustrates an exemplary time division duplex (TDD) time division multiple access (TDMA) frame according to one embodiment of the present invention;

than 4:1 (downlink:uplink). Taking into account the factors of data asymmetry, channel propagation, and available spectrum, an advantageous embodiment of the present invention adopts a flexible approach in which the physical (PHY) layer and the media access (MAC) layer are based on the use of time division duplex (TDD) time division multiple access (TDMA). TDD operations share a single RF channel

'931 Patent, 10:58-62, 14:1-7

Ground 1: Vornefeld and Atsuta

General Access's Rebuttal Arguments Are False and Irrelevant

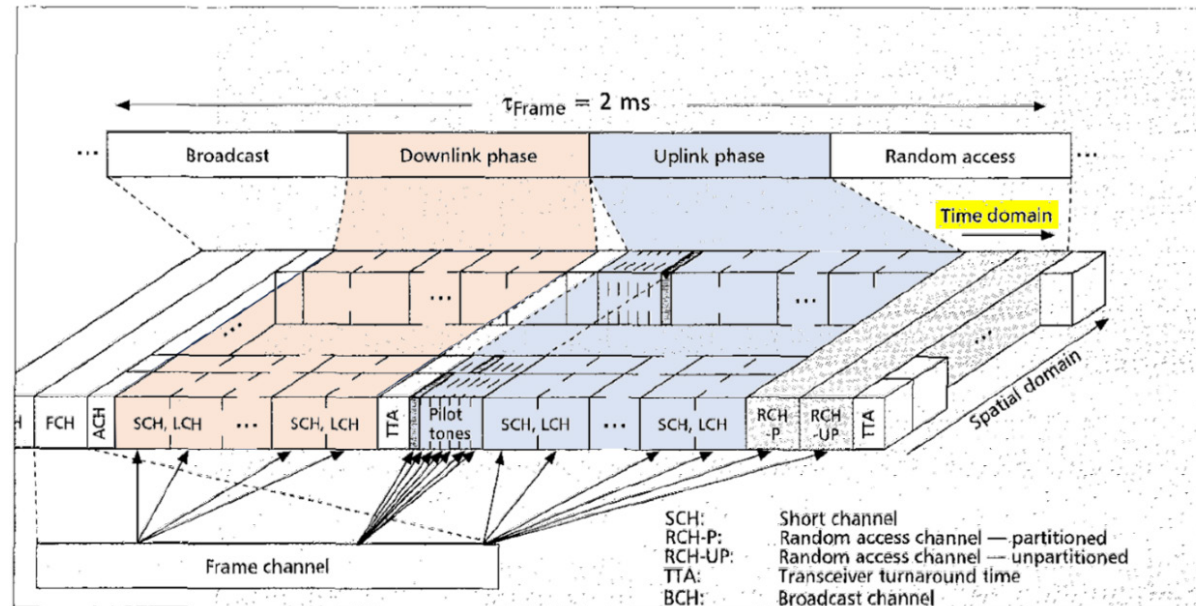
- Atsuta does not teach **TDD** (irrelevant and false) (POR 33-37)
- Atsuta does not teach combining sectors in the **downlink** (false) (POR 37-45)
- Atsuta does not teach **simultaneous** transmissions to multiple users (irrelevant) (POR 45-48)
- Atsuta does not teach **beamforming** (irrelevant) (POR 48-53)
- Atsuta would not **simplify** hardware (false and ignores Atsuta's express teaching) (POR 53-58)

Ground 1: Vornefeld and Atsuta

GAS Argues that “Atsuta Does Not Disclose Transmitting in a TDD Frame”

- Petition relies on Vornefeld to disclose “said TDD frame.” Petitioner does not rely on Atsuta for that limitation.
- “MAC frame starts with two broadcast channels . . . followed by a downlink phase, an uplink phase . . .”

Ex. 1004, 54, Fig. 3.



Ex. 1004, Fig. 3 (annotated)

Ex. 1005, Fig. 4 (annotated)

Ground 1: Vornefeld and Atsuta

GAS Argues that “Atsuta Does Not Disclose Transmitting in a TDD Frame”

- Atsuta’s TDMA frame is compatible with Vornefeld’s TDMA frame.
 - “At the very least, because the frames in Atsuta are comprised of different timeslots reserved for downlink transmission (Ex. 1005, 6:35-58) a POSA would understand that they are compatible with a TDD frame.” Pet., 32.
 - Vornefeld uses a TDMA/TDD frame. Ex. 1004, 53, Fig. 3.
 - The ‘931 Patent also uses a TDMA/TDD frame. ‘931 Patent, 10:58-62 and 14:1-7.
 - GAS’s expert:
 - “Atsuta discloses a basic, conventional TDMA method.” Ex. 2028, ¶77.
 - Admitted that Atsuta’s frame design would not be “consider[ed] odd” by a POSA. Ex. 1024, 192:10-193:15.
 - “If you are designing a system from scratch, you could choose . . . TDD with TDMA.” Ex. 1024, 136:21-137:9.

Ground 1: Vornefeld and Atsuta

Combining Atsuta's Multi-Sector Teaching with Vornefeld's Frame Structure is Straightforward

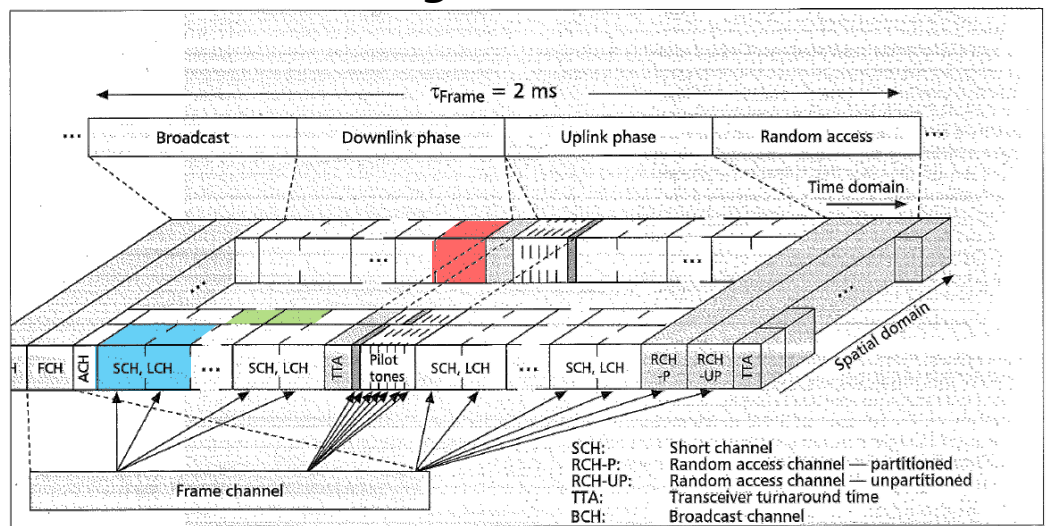
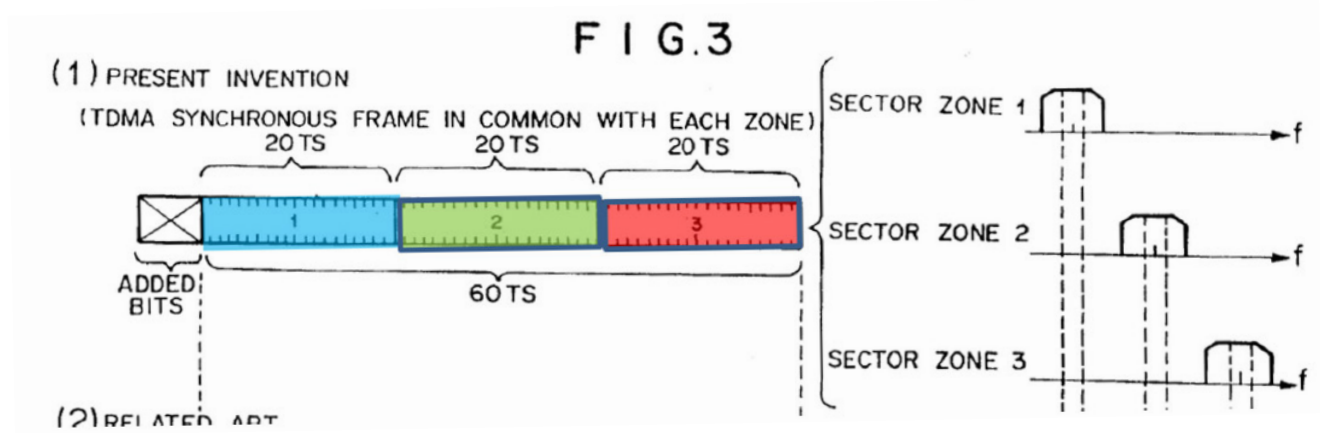


Figure 3. The basic frame structure of the spatially extended MAC protocol.

Ex. 1004, Fig. 3 (annotated)



Ex. 1005, Fig. 3 (annotated)

Ground 1: Vornefeld and Atsuta

GAS Argues that “Atsuta Does Not Disclose Transmitting in a TDD Frame”

- Atsuta’s asymmetry indicates a TDD frame. Ex. 1005, 5:65-6:12.
 - Technical dictionary:
 - TDD is “best suited for asymmetrical applications” and FDD is “appropriate for symmetrical services.” Ex. 1021, 876, 349-50.
 - GAS’s expert:
 - “TDD networks, by contrast, are generally superior for asymmetrical data transmission.” Ex. 2028, ¶152; see Ex. 1021, 44:15-45:15 (agreeing with the dictionary definition).

Ground 1: Vornefeld and Atsuta

GAS Argues that Atsuta Does Not Disclose Combining Sectors in the Downlink Portion

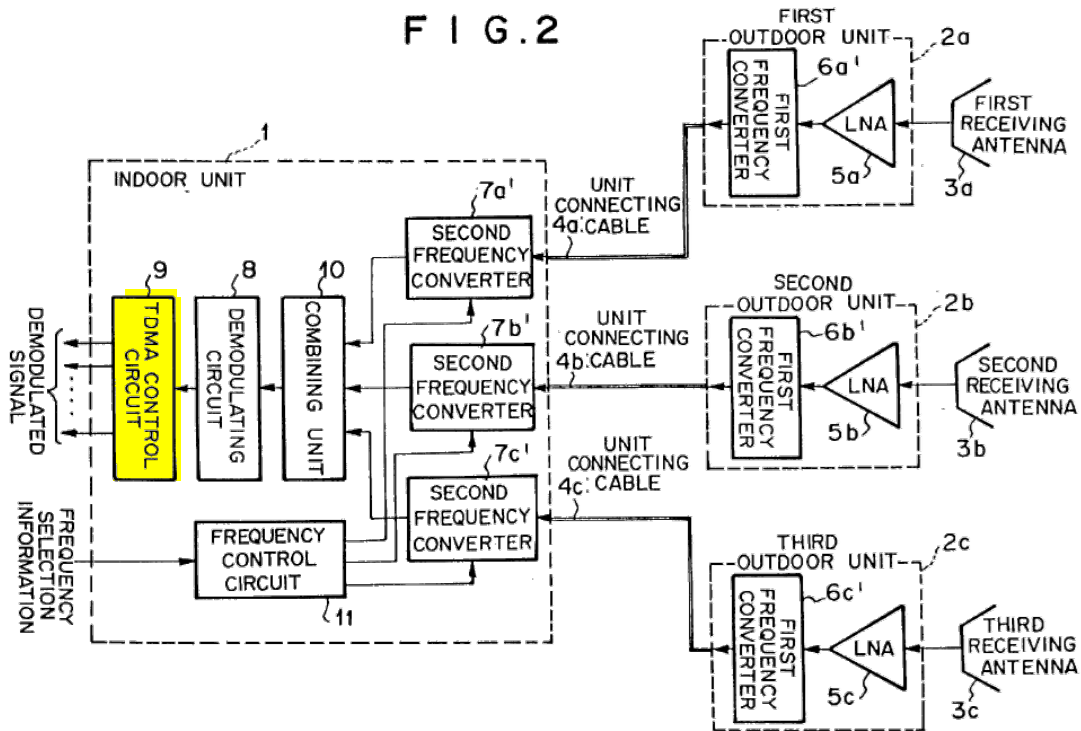
- Vornefeld discloses “said downlink portion.”
 - “LCH serves to transmit user data . . . bidirectionally on the up- and downlink.” Ex. 1004, 54, Fig. 3.
- Atsuta discloses combining sector transmissions into one frame ***in the downlink***.
 - “receives a plurality modulated signals to be transmitted to the subscriber stations, arranges these signals into one signal sequence as a predetermined synchronous frame in the TDMA method” Ex. 1005, Fig. 4, 6:35-64.
 - GAS’s Expert: “Yes, it is [talking about downlink].” Ex. 1024, 172:20-174:9.

Ground 1: Vornefeld and Atsuta

Atsuta Teaches Multi-Sector Frames in Uplink And Downlink

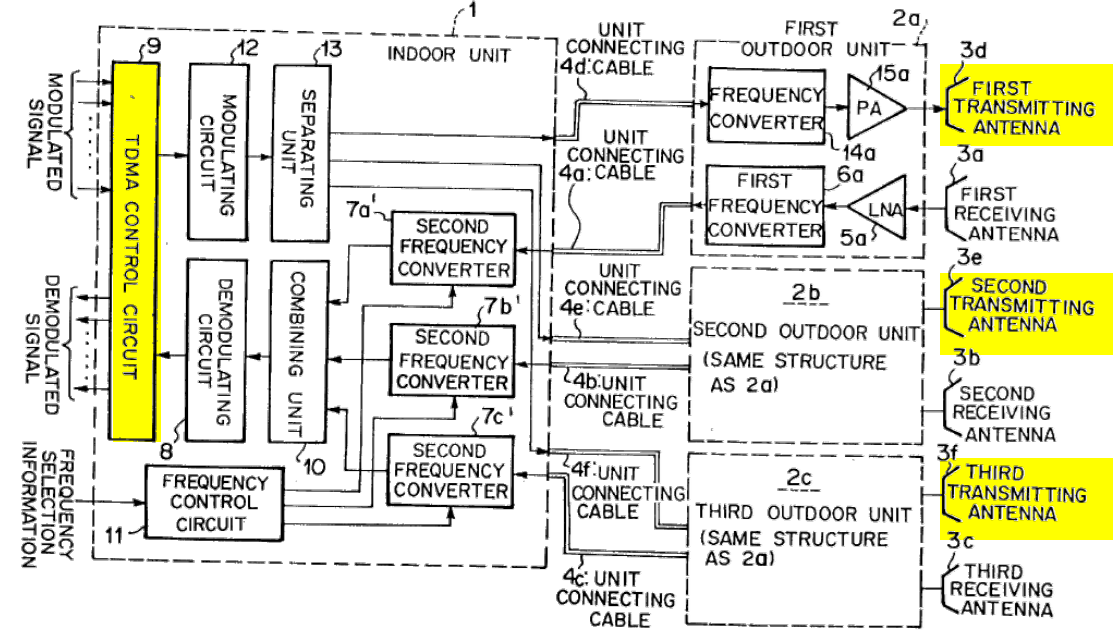
Uplink

F I G . 2



Uplink and Downlink

F I G.4



Ex. 1005, Figs. 2, 4 (annotated)

Ground 1: Vornefeld and Atsuta

GAS's Expert Agrees that Atsuta Teaches Combining Multiple Sectors in a Single Frame in the Downlink

Q [Atsuta] states, "In addition, the TDMA control circuit 9 shown in Figure 4 receives a plurality of modulated signals to be transmitted to the subscriber stations, arranges these signals into one signal sequence as a predetermined synchronous frame in the TDMA method, and outputs the resultant signal sequence to modulating circuit 12." Do you see that?

A Yes.

Q So that's talking about **downlink, correct?**

A **Yes, it is.**

Q And it refers to putting the different signals for the different subscriber stations in a predetermined synchronous frame, correct?

A That is what it literally states.

Q And you would understand a frame to be **a single frame**, correct?

A **As Atsuta describes it, a frame is singular, not plural.**

Ground 1: Vornefeld and Atsuta

Motivation to Combine: GAS's Simultaneous Transmission Argument Is Not Supported

- General Access admits that simultaneous transmission is not required by the claims.
 - “the plain language of the claims does not require ‘simultaneity.’” POR, 31.
- Atsuta is nevertheless compatible with simultaneous transmission, as shown by Vornefeld.
 - Atsuta uses TDMA.
 - Vornefeld combines TDMA and SDMA for simultaneous transmission through beamforming. Ex. 1004, 53; Ex. 1024, 84:17-85:16, 77:12-78:19, 49:21-50:22.
- GAS's “teaches away” argument (POR, 22) rest on *silence*. Ex. 1024, 59:4-60:13.
 - *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (“criticize, discredit or otherwise discourage”).

Ground 1: Vornefeld and Atsuta

Motivation to Combine: GAS's Argument that Atsuta Does Not Teach Beamforming is Irrelevant

- Vornefeld discloses beamforming
- Atsuta is nevertheless compatible with beamforming, as shown by Vornefeld.
 - Atsuta uses TDMA.
 - Vornefeld combines TDMA and SDMA for simultaneous transmission through beamforming. Ex. 1004, 53; Ex. 1024, 84:17-85:16, 77:12-78:19, 49:21-50:22.

Ground 1: Vornefeld and Atsuta

Motivation to Combine: GAS's "Complexity" Argument

- Atsuta's stated purpose is to simplify. Ex. 1005, 2:60-3:8; 3:58-62
 - General Access cannot just ignore the explicit teaching of the reference
- GAS argues that Atsuta's **combined** version of three prior circuits would be more complex than **one** of the prior circuits.
 - The combined circuit would have the same number of outputs as the prior three circuits. Ex. 1024, 150:10-18.
- The argument does not account for the improved design in the **aggregate**. Ex. 1025, ¶¶32-34, 40.

Ground 1: Vornefeld and Atsuta

Motivation to Combine: GAS's Clock Rate and Spectrum Arguments Do Not Hold Up

- GAS argues that Atsuta's design would require shorter time slots (higher clock rate).
 - GAS's expert: "predefined constraints might dictate how long each time slot is." Ex. 2028, 161:17-162:12.
 - "POSA could divide his/her timeslots in any manner preferred." Ex. 1025, ¶39.
- GAS argues that Atsuta's design requires the purchase of more spectrum.
 - Ignores the spectrum dedicated to public use. Ex. 1025, ¶36.
 - Cost is not a bar to obviousness. *In re Farrenkopf*, 713 F.2d 714, 718 (Fed. Cir. 1983).
 - A "carrier would just be utilizing more of the bandwidth it already has licensed." Ex. 1024, 154:16-155:2; Ex. 1025, ¶36.

Ground 1: Vornefeld and Atsuta

Motivation to Combine: GAS's Interference Arguments Are Misplaced

- GAS alleges a “key aspect” of the claims is the uplink-downlink timing (for interference).
 - GAS's expert admits:
 - Any timing requirement in the claims would derive from the conventional understanding of TDD. Ex. 1024, 48:1-17, 11:1-10, 115:11-20.
- Vornefeld and Atsuta both use time slots to avoid interference.
 - “time slots are assigned ... so that the time slots do not overlap.” Ex. 1005, 3:66-4:12.
 - “time-division multiple access (TDMA)” and TDD. Ex. 1004, 52-53.

Ground 1: Vornefeld and Atsuta

Motivation to Combine: GAS's Interference Arguments Are Misplaced

Both Parties' Experts Agree that Preventing Interference is Fundamental to TDMA

- GAS's expert: Admits that preventing interference is "fundamental to the purpose of TDMA." Ex. 1024, 134:3-8, 90:22-91:5.
- Verizon's expert: "Like Vornefeld, Atsuta describes splitting up transmissions on the time axis, and does so by assigning timeslots within a single frame to subscribers in different sectors, thus mitigating interference. Ex. 1005, 6:24-58." Ex. 1002, ¶92

Ground 2: Vornefeld and Goldberg

Goldburg

- Goldburg describes transmitting to subscribers across different “regions” within a single frame. Ex. 1006, 12:11-24.
- Goldburg’s “regions” are created without regard to antenna array transmission area, and instead divide the area such that there are at least as many regions as subscribers.
 - “the number of regions is the number of co-channel users.” Ex. 1006, 20:8-39.

Ground 2: Vornefeld and Goldberg

Goldburg

- Goldburg describes beamforming in which a weight vector (phase and amplitude) is calculated for each region to minimize interference.
 - “weight any downlink signal in phase and amplitude, the weighting describable as a complex valued weight vector.” Ex. 1006, 6:22-37.
 - “by controlling the phase (timing) of downlink signals, signals to neighboring subscribers can be sent at different times, minimizing interference. And by controlling the amplitude (signal strength) of the downlink signal, the signal can be received by the targeted subscriber without overwhelming neighboring subscribers.” Ex. 1002, ¶119.

Ground 2: Vornefeld and Goldberg

Motivation to Combine: Goldberg Offers Details for Vornefeld's Weight Vectors (Beamforming)

- Vornefeld
 - "weight vectors that control the beam pointing direction to maximize the amount of useful energy." Ex. 1004, 56.
 - "beamforming is performed ... by controlling the amplitudes and phases." Ex. 1004, 52.
- Goldberg
 - "Design weight vectors for each region." Ex. 1006, 20:8-39.
 - "beamformed so that the orthogonal signals are delivered to the different beams in the array antenna." Ex. 1006, 5:25-58; Ex. 1024, 178:19-179:13.

Ground 2: Vornefeld and Goldberg

Motivation to Combine: Both Use TDMA and Have Consistent Frame Structures

Both Use TDMA to Reduce Interference

- Vornefeld: "Multiple access is realized as time-division multiple access." Ex. 1004, 52.
- Goldberg: "combined into a TDMA frame." Ex. 1006, 9:59-11:23.

Both Have Consistent Frame Structures

- Vornefeld: transmission to subscriber with the "granularity of a single time slot." Ex. 1004, 54.
- Goldberg : "timeslots may be used for [traffic channel] with one or more users." Ex. 1006, 3:47-4:18.

Ground 2: Vornefeld and Goldberg

GAS Argues that Goldberg Does Not Disclose “a TDD Frame”

- Vornefeld discloses “said TDD frame.” Ex. 1004, 54, Fig. 3.
- Goldberg identifies PHS—a TDMA/TDD system. Ex. 1022, pp. 429-430; Ex. 1023, 544.
 - “Some examples of a cellular system to which the present invention can be applied are systems using variants of the Personal Handy Phone System (PHS) protocol.” Ex. 1006, 1:48-61.
 - “applicable to all download broadcasts and transmissions.” Ex. 1006, 2:6-12.
 - “How to adapt these for other air interfaces and for other multiplexing schemes would be clear to one of ordinary skill in the art.” Ex. 1006, 6:50-58.

Ground 2: Vornefeld and Goldberg

GAS Argues that Goldberg Does Not Apply Under the District Court's Construction of Sector

- Goldberg applies under “any reasonable construction of ‘sector.’” Pet., 40.
 - “Goldberg’s ‘regions’ are created without regard to antenna array transmission area.” Ex. 1002, ¶117.
 - “the number of regions is the number of co-channel users.” Ex. 1006, 20:8-39.
 - GAS’s expert: “sectorized systems using antenna arrays discussed in Goldberg . . . match the District Court claim construction.” Ex. 1024, 202:1s8-22.

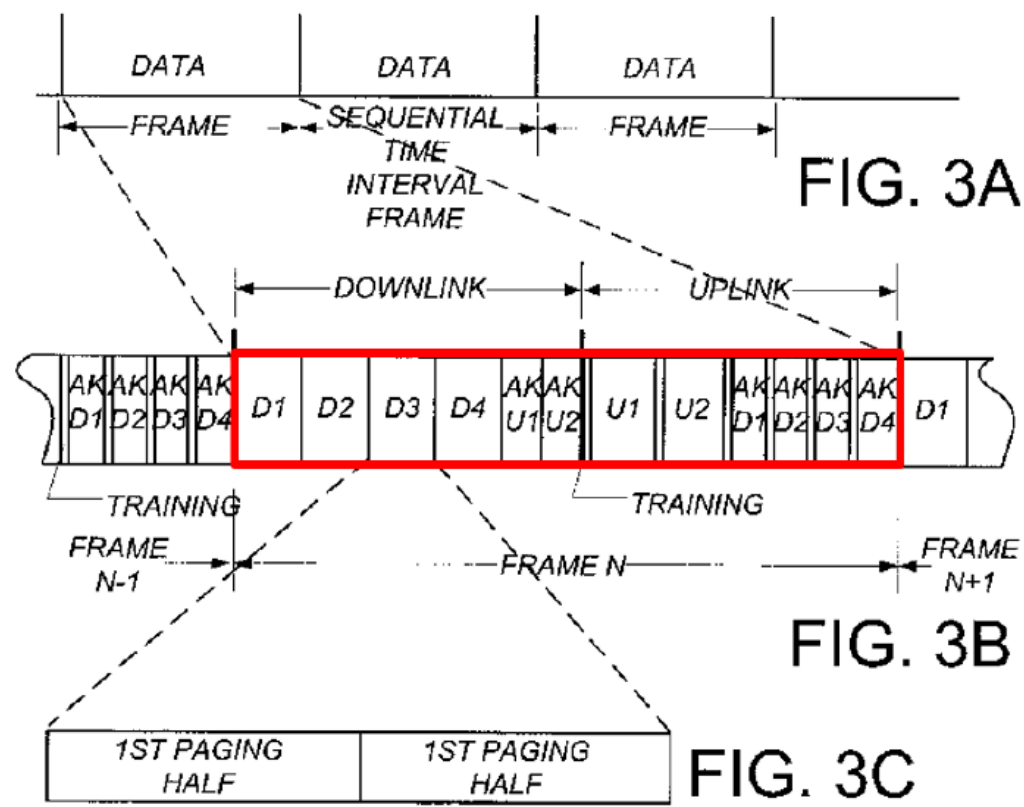
Ground 3: Youssefmir and Atsuta

Youssefmir

- Youssefmir uses TDMA/TDD to transmit downlink data to subscribers in a single frame.
 - “a communication system 100 that is a TDMA system that uses time domain duplexing (TDD).” Ex. 1007, 7:1-7.
 - “The frame in accordance with one TDMA embodiment of the invention is subdivided into a selected number of downlink data transfer periods (timeslots) D1, D2, D3, etc.” Ex. 1007, 18:15-19:8.
 - “Downlink data for different subscribers may be assigned to different downlink slots.” Ex. 1002, ¶143.s

Ground 3: Youssefmir and Atsuta

Youssefmir Describes TDD Frames



Ex. 1007, Fig. 3 (annotated)

Ground 3: Youssefmir and Atsuta

Youssefmir

- Youssefmir describes beamforming across different sectors.
 - “Smart antenna system 223 has an array of antenna elements 104, a beamforming network 225 that forms a set of fixed beams for the antenna elements of array 104.” Ex. 1007, 7:33-61.
 - “a sectorized system.” Ex. 1007, 14:5-19.

Ground 3: Youssefmir and Atsuta

Motivation to Combine: Hardware Simplification

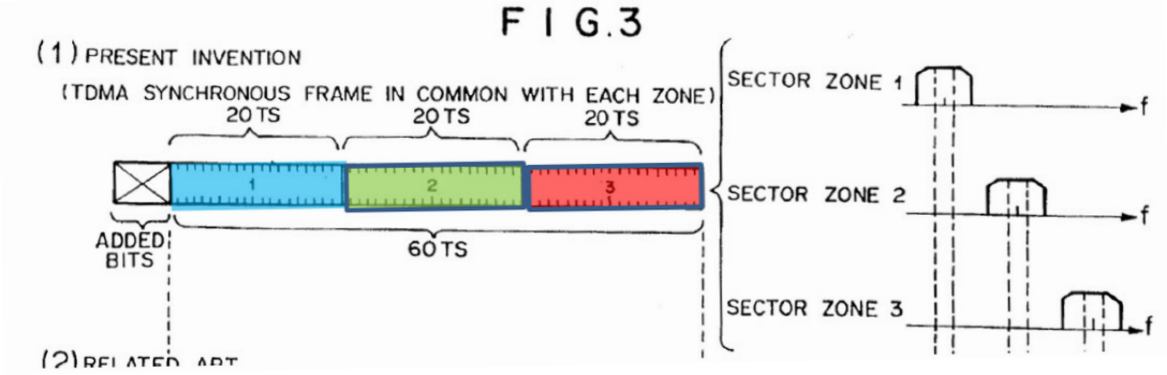
Atsuta Simplifies Youssefmir's Hardware Requirements

- “An object of the present invention is to share the same functional circuit so as to simpl[ify] the structure [of] the entire apparatus and reduce the size and power consumption thereof.” Ex. 1005, 2:60-3:8.

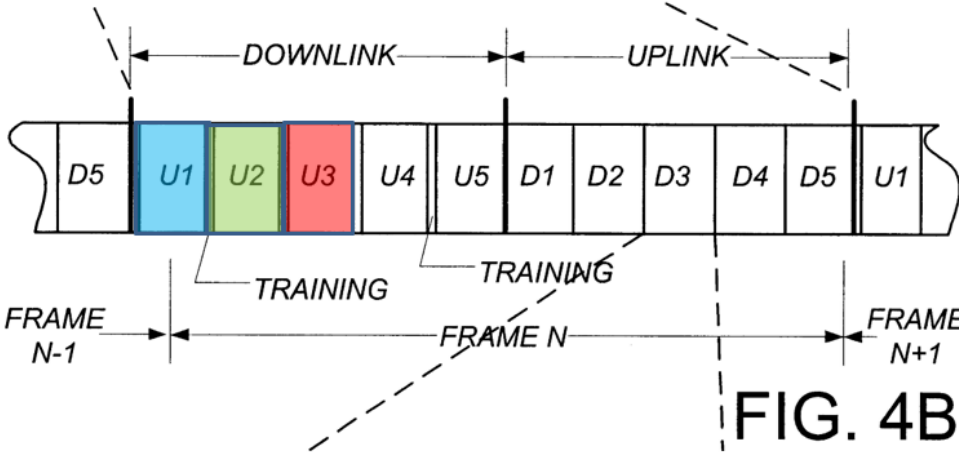
Verizon's Expert Opined That This Is An Obvious Design Choice

- “Youssefmir describes transmitting downlink data to multiple subscribers in a single frame, and Atsuta provides additional detail by describing that the different subscribers may be in different sectors And by implementing Atsuta's features, Youssefmir receives the benefit of simplified hardware requirements.” Ex. 1002, ¶145.

Ground 3: Youssefmir and Atsuta



Ex. 1005, Fig. 3 (excerpt, annotated)



Ex. 1007, Fig. 4 (excerpt, annotated)

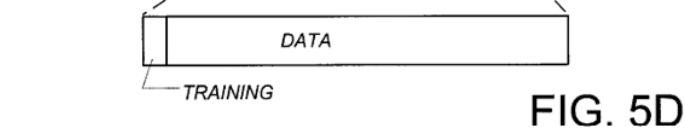
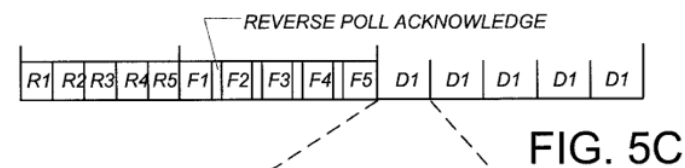
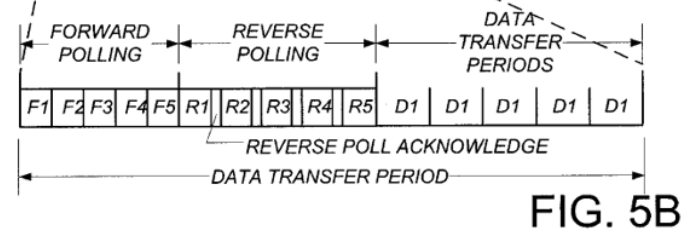
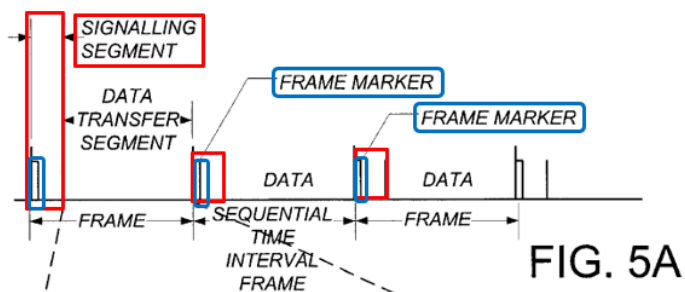
Ground 3: Youssefmir and Atsuta

GAS Argues Youssefmir Does Not Disclose a Broadcast Beam Signal

- Youssefmir's broadcast beam signal is sent to all users, across sectors.
 - "each signaling segment starts with a frame marker signal from the base station to synchronize all remote user terminals." Ex. 1007, Figs. 5A-5C, 18:23-33.
 - "the 'signaling segment' is a 'start of frame field' because, as shown [] with respect to Fig. 5A, [it] appears at the start of the frame." Ex. 1002, ¶156.

Ground 3: Youssefmir and Atsuta

Youssefmir Discloses A Broadcast Beam Signal at the Start of the Frame



Ex. 1007, Fig. 5 (annotated)

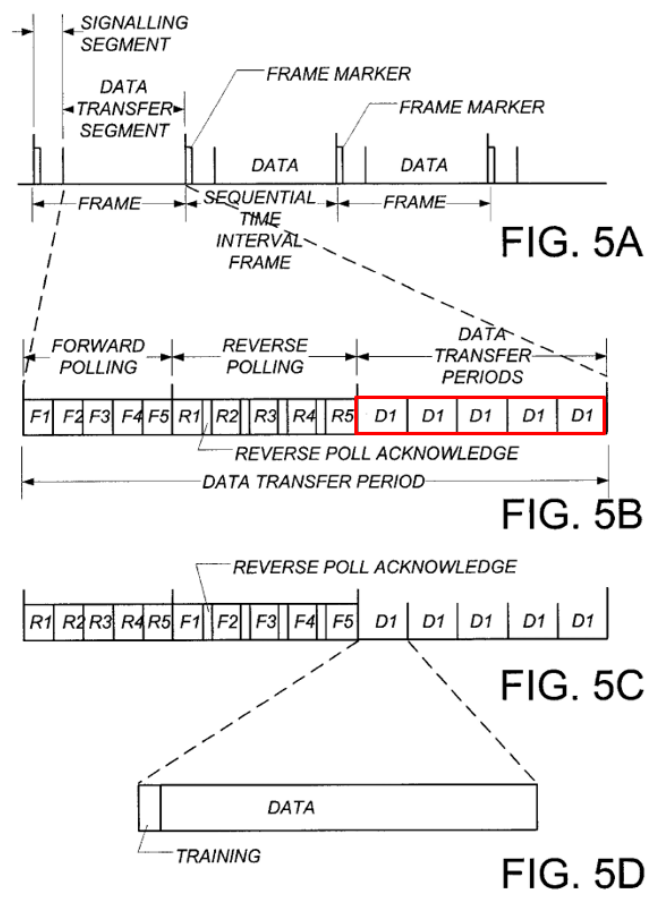
Ground 3: Youssefmir and Atsuta

GAS Argues Youssefmir Does Not Disclose Downlink Transmissions

- Youssefmir discloses subsequently transmitting downlink data. Ex. 1007, 13:12-24, 25:52-26:11, Figs. 3-5.
 - “subsequent to the signaling segment at the start of the TDD frame, multiple data slots are reserved for downlink data traffic. Ex. 1002, ¶157.

Ground 3: Youssefmir and Atsuta

Youssefmir Discloses Downlink Data Transmissions



Ex. 1007, Fig. 5 (annotated)

Grounds 4-6: Tangemann Grounds

Tangemann

- Tangemann describes dividing a cell site into “minisectors,” each “minisector” being a “slice” of the total cell site. Ex. 1008, 746, Fig. 2.
- “Tangemann’s ‘minisectors,’ as portions of the cell area, match Patent Owner’s [not adopted] use of ‘sector’ to mean a ‘geographic portion of the cell site.’” Ex. 1002, ¶194.

Tangemann

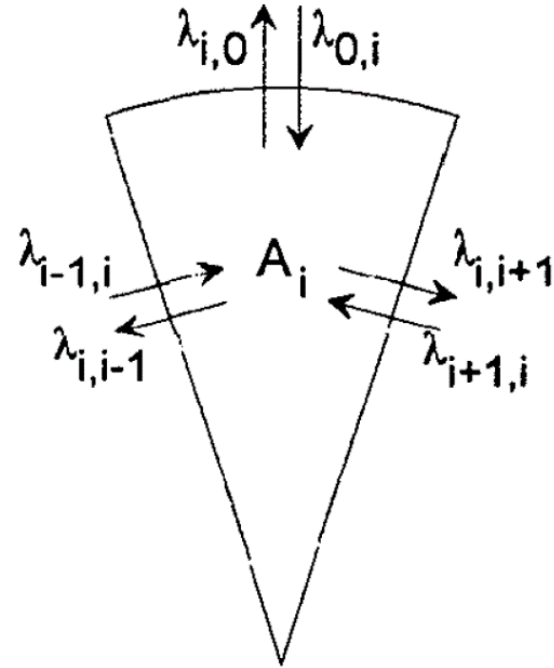


Fig. 2: Flow model for a minisector

Ex. 1009, Fig. 2

ADDITIONAL SLIDES

Ground 1: Vornefeld and Atsuta

Vornefeld Discloses Broadcast Beams to the Entire Radio Cell

antennas consisting of M identical antenna elements. Due to the single-element antenna characteristic, the covered area of the ULA is restricted to values below 180° ; a triangular configuration of three ULAs might be used to cover the whole radio cell. This also takes into account that the individual

Ex. 1004, 52

The '931 Patent and Technology

- Directed to wireless communication between a base station and subscribers. '931 Patent, Abstract.

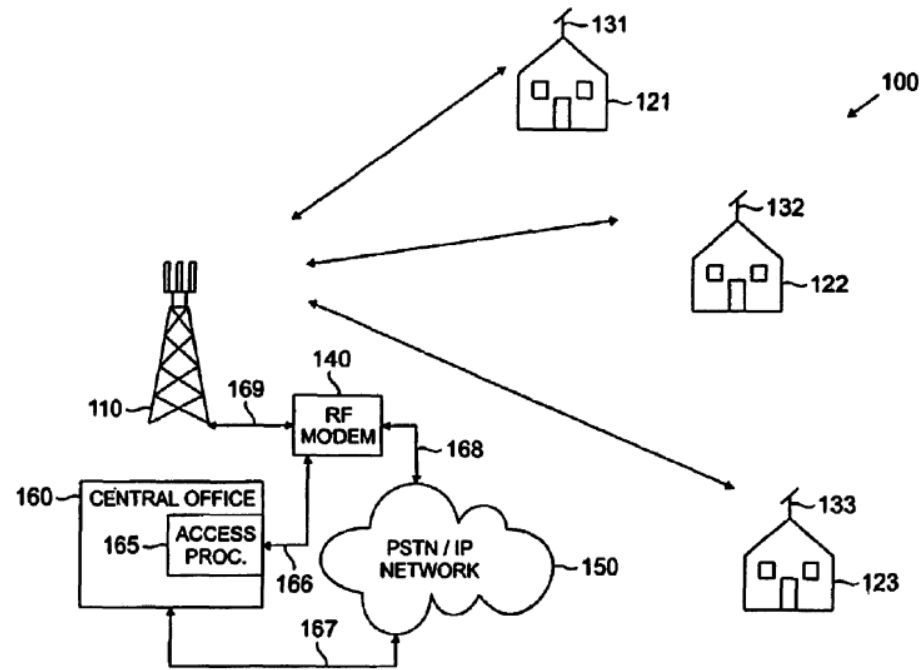


FIG. 1

'931 Patent, Fig. 1

The '931 Patent and Technology

Sector

- The '931 Patent acknowledges that sectorized cell sites were known. '931 Patent, 8:12-19.
- Definitions in the Record
 - EDTX: "areas defined by an arc around the cell site, each covered by its own antenna." Ex. 2027, 24.
 - Petition: "arc of a cell site served by an individual or antenna array." Ex. 1014, 10-11.
 - "a portion of the cell site" (not adopted by GAS). Ex. 1017, 6-7.

The '931 Patent and Technology

Frame

- The '931 Patent:
 - “The TDD frame consists of a fixed set of time slots for the uplink and the downlink.” '931 Patent, 7:21-24.
- Petitioner’s Expert:
 - “In the context of TDMA . . . and/or TDD . . . the frame fields are timeslots, each timeslot being assignable to, e.g., a different user for either downlink or uplink.” Ex. 1002, ¶58.

The '931 Patent and Technology

Frame

- Technical Dictionaries:
 - “A data structure that consists of fields, predetermined by a protocol, for the transmission of user data and control data.” Ex. 1018, 285-286.
 - “one complete cycle of events in time division multiplexing.” Ex. 1021, pp. 372-73 (entry 3); Ex. 1024, 13:3-14:15 (GAS’s expert identifying Ex. 1021 as “a good example”).

The '931 Patent and Technology

Frame

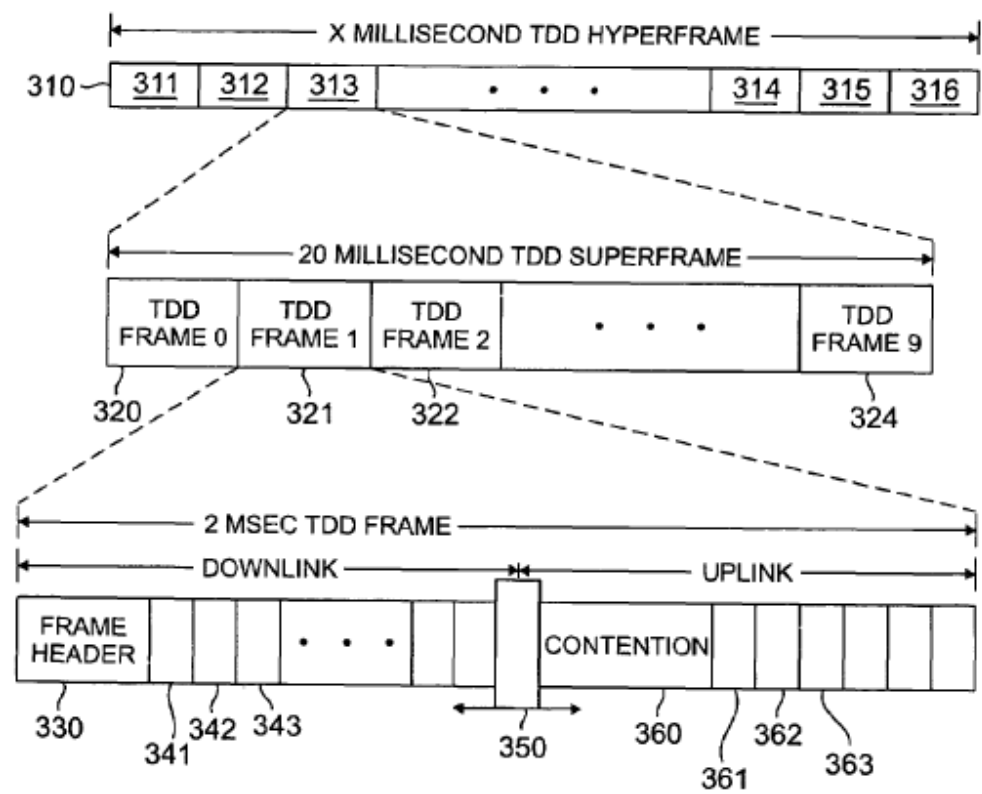


FIG. 3

'931 Patent, Fig. 3

The '931 Patent and Technology

Acknowledges “Multiple Access” Technologies Were Known

- FDMA: “subscribers use separate frequency channels;”
- TDMA: “subscribers share a frequency channel but allocate spans of time to different users;” and
- SDMA: “subscribers share a frequency but one or more physical channels are formed using antenna beam forming techniques.” '931 Patent, 5:32-52.
- “[C]ellular systems use a combination of ... [multiplexing techniques] to support a number of users in a cell.” '931 Patent, 5:53-58; see Ex. 1024, 19:10-14.

The Board's Prior Ruling

GAS's POR Alleged Incompatibility of TDMA and TDD

109. Petitioner alleges that, “[a]t the very least, because the frames in Atsuta are comprised of different timeslots reserved for downlink transmission, a POSA would understand that they are compatible with a TDD frame.” Petition, 21 (citation omitted). I disagree for the reasons described above in Section V.D that differentiate **TDMA and TDD**. For these reasons, a POSA would not understand that any given TDMA frame that might be implied or described by Atsuta is “compatible with a TDD frame.” Additionally, as discussed above, Atsuta contemplates its invention as

But the claimed TDD frames (which provide a means for bidirectional communication) are not the same as Atsuta's TDMA (which provides a mean for multiplexing). POR 1, 44.

134. Because Atsuta never describes transmission to more than one mobile station at a time, let alone in more than one sector, a POSITA would understand that Atsuta is not compatible with one of the principal objectives of beamforming and SDMA—which is taught by Vornefeld—i.e., that of supporting **simultaneous transmission**. See Ex. 1004, 52. For this reason, a POSITA would not seek to combine Atsuta with Vornefeld's beamforming device.

Ex. 2028, ¶¶ 109, 134.

“Atsuta is not compatible with one of the principal objectives of beamforming and SDMA—which is taught by Vornefeld.” POR, 48.

The Board's Prior Ruling

Dr. Almeroth on Combining Atsuta's Frame Design with Vornefeld

65. Atsuta describes using a single frame to assign timeslots to subscribers in different sectors. Ex. 1005, 6:24-54, Fig. 3.

88. Like Vornefeld, Atsuta is directed to TDMA frame-based communication between a base station and subscribers. Ex. 1005, 2:64-3:8. Atsuta's base station transmits downlink data to subscribers in different sectors within a single TDMA frame. Ex. 1005, 6:24-61. Atsuta's Fig. 3 illustrates a TDMA frame comprising 60 timeslots, wherein every 20 timeslots is assigned to a subscriber in a different zone.

92. Like Vornefeld, Atsuta describes splitting up transmissions on the time axis, and does so by assigning timeslots within a single frame to subscribers in different sectors, thus mitigating interference. Ex. 1005, 6:24-58. Atsuta's system also simplifies the signal processing structure at the base station, reducing the required number of functional circuits (and computational requirements) to a single circuit. Ex 1005, 2:60-64.

94. In addition, Vornefeld's and Atsuta's frame structures are consistent with each other. Both are directed to TDMA frame structured transmissions between a base station and subscribers. Vornefeld uses a broadcast portion at the start of the frame, followed by downlink and uplink. Ex. 1004, Fig. 3, 54. Atsuta generalizes the opening broadcast portion as "added bits," and reserves the remaining time slots for different sectors, recognizing that transmissions may be downlink or uplink. Ex. 1005, Fig. 4, 6:2-7, 6:24-61. Both also consider the spatial

Reply, 10; Ex. 1002.

The Board's Prior Ruling

Dr. Almeroth on Combining Atsuta's Frame Design with Vornefeld

95. Because Vornefeld recognized the need to split up transmissions on the time axis, and Atsuta teaches that technique by transmitting to different subscribers (in different sectors) in a single frame, with the benefit of simplified hardware, a POSA would have found the use of Atsuta's frame structure (and circuitry for the same) with Vornefeld's system to be an obvious design choice.

transmit data to subscribers in various sectors using beams. While, in the Board's view, Vornefeld may have used different frames for different sectors, Atsuta simply combines the slots for different sectors into one frame, simplifying the necessary hardware. Ex. 1005, 2:60-64. In short, the combination would be a simple matter of applying Atsuta's frame structure methodology to Vornefeld's system, as well as potentially simplifying the hardware requirements.

Ex. 1002, ¶196.

CERTIFICATE OF SERVICE

The undersigned certifies that a complete copy of Petitioner's Demonstratives was served on the Patent Owner at:

sspires@skiermontderby.com

michael.valaik@bartlitbeck.com

nosson.knobloch@bartlitbeck.com

DATED: September 13, 2024

/Justin J. Oliver/

Justin J. Oliver

VENABLE LLP

600 Massachusetts Avenue, NW

Washington, D.C. 20001

Telephone: 202-721-5423

Facsimile: 202-344-8300

Email: JOliver@Venable.com