UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN JOSE DIVISION

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| CORNING OPTICAL COMMUNICATIONS WIRELESS, LTD.,<br><br>Plaintiff,<br>v.<br><br>SOLID INC., et. al.,<br><br>Defendants. | Case No. 5:14-cv-03750-PSG<br>**CLAIM CONSTRUCTION ORDER**<br>**(Re: Docket No. 176)** |

In this patent infringement suit, Plaintiff Corning Optical Communications Wireless, Ltd. alleges that Defendants SOLiD Inc. and Reach Holdings, LLC (collectively, "SOLiD") infringe U.S. Patent Nos. 5,969,837 and 7,483,504. The parties submitted 14 claim construction disputes for resolution by the court.[1] On April 22, 2015, the court held a claim construction hearing and the same day issued a summary construction order.[2] At that time, the court explained that a more complete order would follow providing the court's reasoning.[3] The court now does just that.

**I.**

This case is about distributed antenna system networks that improve wireless coverage in

[1] The parties also stipulated to the construction of three terms. *See* Docket No. 146 at 1–2.

[2] *See* Docket Nos. 198, 199.

[3] *See* Docket No. 198 at 3.

buildings and other large structures.

The '837 patent was filed on July 1, 1997 and issued on October 19, 1999.[4] The '837 patent describes a DAS system which uses a single optical fiber "simultaneously for a number of wireless communications systems."[5] Figure 1 of the '837 patent depicts a "typical system [in which] a plurality of wireless network services, such as PCS, GSM and other wireless telephone and radio services as well as paging services, each communicate via an appropriate antenna (not shown) with one or more multi-system stations:"[6]

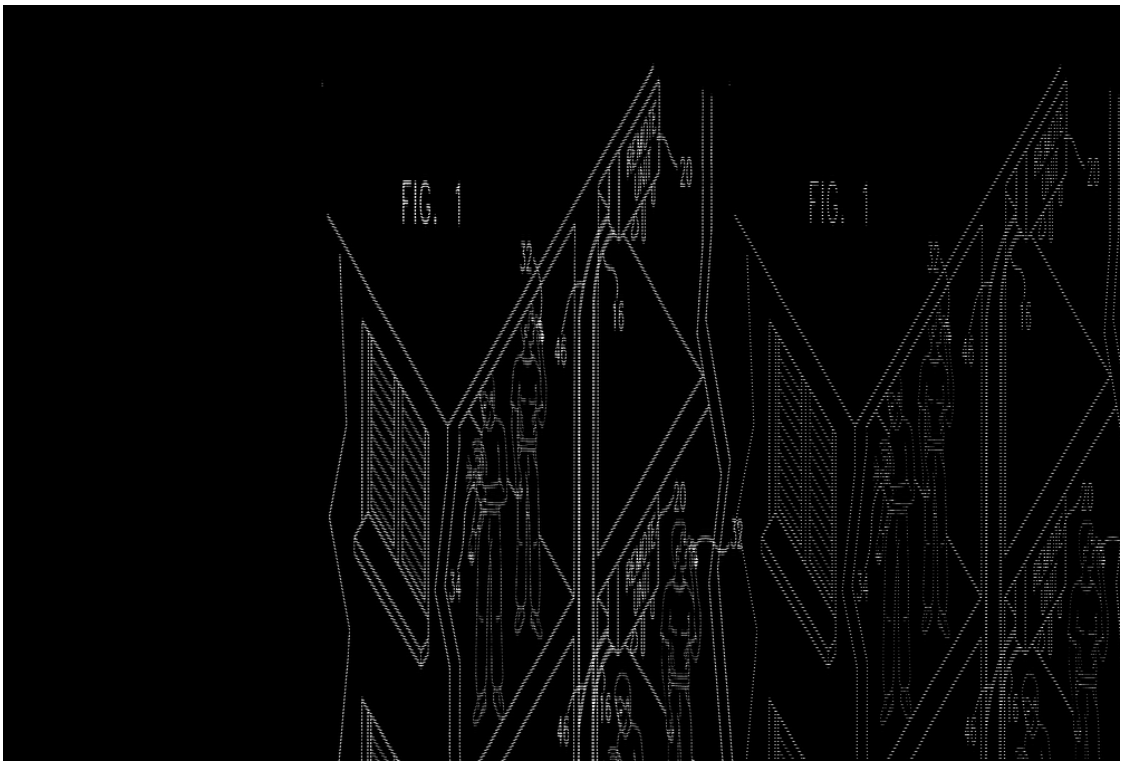



Figure 1 shows a base unit (10) "which communicates with each of the required wireless network services" via "fiberoptic cables 16 to a plurality of remote units 20."[7] The base station combines the wireless signals into a multiplexed RF, converts the RF signal to an optical signal, and sends to optical signal to the remote unit.[8] Each remote unit receives the optical signal

[4] *See* Docket No. 177-1 at 1.

[5] *Id.* at col.1 ll.43-46.

[6] *Id.* at col.3 ll.36-41.

[7] *Id.* at col.3 ll.52-58.

[8] *See Id.*

transmitted via the fiberoptic cable, converts the optical signal to RF, splits the RF signal, and then transmits the signal through "individual antennas, such as antennas 30, 28 and 26 for PCS, GSM and paging networks respectively."[9]

Claim 1 of the '837 patent requires:

> 1. A communications station comprising:
> a base unit comprising:
> a communications interface for communicating with plural wireless communications networks;
>
> wherein the plural wireless communications networks comprise at least two communications networks selected from the group consisting of cellular telephone networks cordless telephones, wide area data networks wireless local area networks, personal communications systems, personal communications networks, paging/messaging networks and satellite mobile systems;
>
> a received communications combiner for combining received analog communications signals received from said plural wireless communications networks into a single radio frequency analog output;
>
> a transmit communications splitter for splitting previously combined transmit analog communications signals to be transmitted to said plural wireless communications networks into plural radio frequency analog outputs;
>
> at least one fiberoptic transmitter receiving said single radio frequency analog output and providing a corresponding optical output; and
>
> at least one fiberoptic receiver receiving an optical input and providing an RF analog output containing previously combined transmit analog communications signals;
>
> a plurality of remote units, each comprising:
> plural antennas for communicating with communicators along plural wireless communications networks;
>
> a received communications splitter for splitting previously combined received analog communications signals from said base unit and supplying them to said plural antennas;
>
> a transmit communications combiner for combining transmit analog communications signals from said plural antennas into a combined radio

[9] *Id.* at col.3 ll.62-67.

frequency analog output;

a fiberoptic transmitter receiving said combined radio frequency analog output and providing a corresponding optical output; and

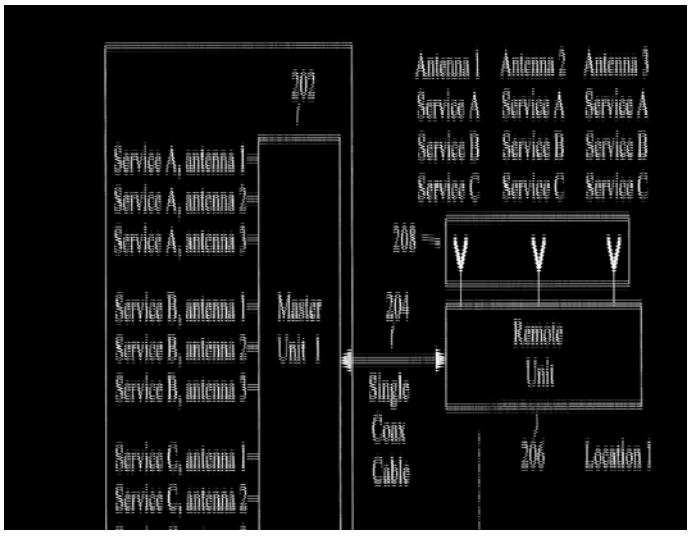
a fiberoptic receiver receiving an optical input and providing an RF analog output to said received communications splitter containing previously received transmit analog communications signals;

a first optical fiber connecting each fiberoptic transmitter of said base unit with a corresponding fiberoptic receiver in a corresponding remote unit; and

a second optical fiber connecting each fiberoptic transmitter of a remote unit with a corresponding fiberoptic receiver in said base unit; and

wherein a low frequency control signal is multiplexed by said communications interface onto said optical fiber for providing loop back alarm status of each remote unit and for providing control signals thereto, which control amplifier gain and balance thereof.[10]

The '504 patent was filed on February 6, 2008 and issued on January 27, 2009.[11] The '504 patent discloses "methods and systems for carrying different signals required for MIMO [multiple input multiple output] communication using a single coaxial cable between two endpoints of a DAS, e.g. between a distribution point and each of the antenna locations."[12] Figure 2 of the '504 patent is a schematic representation of a DAS system using a single coaxial cable:




[10] *Id.* at col.6 l.17-col.7 l.5.

[11] *See* Docket No. 177-2 at 1.

[12] *Id.* at col.1 ll.62-66.

Figure 2 shows three services (Service A, Service B, and Service C) distributed from service combiner (210) to antenna arrays (208) in N remote locations.[13] A remote unit (206) with antenna array (208) serves each remote location.[14] "All signals of the three antennas, of all services, in both directions (Forward and Reverse) between a Master unit 202 and Remote unit 206, are transferred ('propagated') via a single coaxial cable 204."[15]

Claim 1 of the '504 patent requires:

> 1. A method for propagating multiple input multiple output (MIMO) over a distributed antenna system (DAS) network, comprising the steps of:
> a) providing a plurality n of original MIMO signals;
>
> b) at a first endpoint of the DAS network, frequency shifting n−1 of the MIMO signals into signals with n−1 separate frequencies, with one MIMO signal left un-shifted in frequency;
>
> c) propagating the n−1 frequency shifted signals and the un-shifted frequency signal together over a single coaxial cable extending for at least part of a path from the first endpoint to a second endpoint of the DAS network; and
>
> d) at the second endpoint, reconstructing the original MIMO signals.[16]

Following the *Markman* hearing held in this case, the court construed the disputed claim terms as follows:[17]

| PATENT NO. | CLAIM TERM/PHRASE | CONSTRUCTION |
|---|---|---|
| '837 | "[remote unit comprising] plural antennas for communicating with communicators along plural wireless communications networks" | "two or more antennas for sending and/or receiving wireless signals to/from communications devices over the plural wireless communications networks" |

[13] *Id.* at col.4 ll.22-35.

[14] *Id.*

[15] *Id.* col.4 ll.29-32.

[16] *Id.* col.10 ll.8-22.

[17] *See* Docket No. 198.

| | | |
|---|---|---|
| ’837 | “wherein a low frequency control signal is multiplexed by said communications interface onto said optical fiber” | “a low frequency control signal is a signal used to convey control information and having a lower frequency than the analog communications signals; the communications interface includes the device(s) and/or circuitry that multiplex(es) the low frequency control signal with another signal to be transmitted on the optical fiber” |
| ’837 | “wherein a low frequency data signal is multiplexed by said communications interface to a microprocessor” | “a low frequency data signal is a signal used to convey data and having a lower frequency than the analog communications signals; the communications interface includes the device(s) and/or circuitry that multiplex(es) the low frequency data signal with another signal to be transmitted to a microprocessor” |
| ’837 | “fiberoptic transmitter receiving said [single/combined] radio frequency analog output and providing a corresponding optical output” | Plain and ordinary meaning |
| ’837 | “fiberoptic receiver receiving an optical input and providing an RF analog output” | Plain and ordinary meaning |
| ’837 | “soft limiter for substantially preventing distortion due to an inadvertent increase in communication power” | “device(s) and/or circuitry for reducing a signal’s power without substantially distorting the information conveyed by the signal” |
| ’837 | “wherein a single duplex cable interconnects each of said antennas with said communications interface” | “wherein a single cable that allows transmission in both directions interconnects each of said antennas with said communications interface” |
| ’504 | “multiple input multiple output (MIMO) signals” | “multiple signals that have overlapping frequency spectrums and that are transmitted and/or received by separate antennas with overlapping coverage areas and that carry a different data stream” |
| ’504 | “endpoint [of a DAS network]” | “(1) antenna location [of a DAS network] communicating with end users (“antenna endpoint”), or (2) distribution location [of a DAS network] where signals are received from a radio service(s) source and processed signals are distributed to at least one antenna location (“distribution endpoint”)” |
| ’504 | “frequency shifting n-1 of the MIMO signals into signals with n-1 separate frequencies” | “changing the frequency of n-1 of the MIMO signals, each to a different frequency, to create n-1 frequency shifted signals” |
| ’504 | “a single coaxial cable extending for at least part of a path from the first endpoint to a second endpoint of the DAS network” | “a single coaxial cable connected to an antenna endpoint and extending for at least part of a path to a distribution endpoint of the DAS network, for carrying both uplink and downlink signals” |

| | | |
|---|---|---|
| ’504 | “at the second endpoint, reconstructing the original MIMO signals” | “at the second endpoint, constructing a replica of the original MIMO signals” |
| ’504 | “providing a plurality n of original MIMO signals” | “providing a number (n) of MIMO signals, where n is two or more” |
| ’504 | “providing a plurality of MIMO signals belonging to a plurality of services” | “providing two or more MIMO signals from each of two or more services” |

**II.**

This court has jurisdiction under 28 U.S.C. §§ 1331 and 1338. The parties further consented to the jurisdiction of the undersigned magistrate judge under 28 U.S.C. § 636(c) and Fed. R. Civ. P. 72(a).

Ten years after the Federal Circuit’s seminal *Phillips* decision,[18] the canons of claim construction are now well-known—if not perfectly understood—by both parties and courts. “To construe a claim term, the trial court must determine the meaning of any disputed words from the perspective of one of ordinary skill in the pertinent art at the time of filing.”[19] This requires a careful review of the intrinsic record comprised of the claim terms, written description and prosecution history of the patent.[20] While claim terms “are generally given their ordinary and customary meaning,” the claims themselves and the context in which the terms appear “provide substantial guidance as to the meaning of particular claim terms.” Indeed, a patent’s specification “is always highly relevant to the claim construction analysis.”[21] Claims “must be read in view of the specification, of which they are part.”[22] Although the patent’s prosecution history “lacks the clarity of the specification and thus is less useful for claim construction purposes,” it “can often inform the meaning of the claim language by demonstrating how the inventor understood the

[18] *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc).

[19] *Chamberlain Group, Inc. v. Lear Corp.*, 516 F.3d 1331, 1335 (Fed. Cir. 2008).

[20] *See id.* (“To construe a claim term, the trial court must determine the meaning of any disputed words from the perspective of one of ordinary skill in the pertinent art at the time of filing. Intrinsic evidence, that is the claims, written description, and the prosecution history of the patent, is a more reliable guide to the meaning of a claim term than are extrinsic sources like technical dictionaries, treatises, and expert testimony.”) (citing *Phillips*, 415 F.3d at 1312).

[21] *Phillips*, 415 F.3d at 1312–15.

[22] *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995); *see also Ultimax Cement Mfg. Corp v. CTS Cement Mfg. Corp.*, 587 F. 3d 1339, 1347 (Fed. Cir. 2009).

invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be."[23] The court also has the discretion to consider extrinsic evidence, including dictionaries, learned treatises and testimony from experts and inventors.[24] Such evidence, however, is "less significant than the intrinsic record in determining the legally operative meaning of claim language."[25]

A patent applicant must "particularly point[ ] out and distinctly claim[ ] the subject matter which the applicant regards as his invention."[26] "[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention."[27] The definiteness standard requires "clear notice of what is claimed, thereby appris[ing] the public of what is still open to them."[28] Therefore, "a patent does not satisfy the definiteness requirement of § 112 merely because 'a court can ascribe *some* meaning to a patent's claims.'"[29] "The claims, when read in light of the specification and the prosecution history, must provide objective boundaries for those of skill in the art."[30]

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[23] *Phillips*, 415 F.3d at 1317 (internal quotations omitted).

[24] *See id.* ("Although we have emphasized the importance of intrinsic evidence in claim construction, we have also authorized district courts to rely on extrinsic evidence, which 'consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises.'") (quoting *Markman*, 52 F.3d at 980).

[25] *Id.* (citing *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004)) (internal quotations and additional citations omitted).

[26] 35 U.S.C. § 112(b). The asserted patents were filed before the effective date of the Leahy Smith America Invents Act ("AIA"), which applies to patent applications filed on or after September 16, 2012. Therefore, all citations to § 112 refer to the pre-AIA statute, which contains paragraph numbers rather than lettered subsections.

[27] *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014).

[28] *Id.* at 2129.

[29] *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014) (quoting *Nautilus*, 134 S. Ct. at 2130).

[30] *Interval Licensing*, 766 F.3d at 1371.

## III.

The parties request construction of a total of seven claim terms as to the '837 patent. The court construes the terms as follows.

### A. Issue #1: "plural antennas for communicating with communicators along plural wireless communications networks"

| CLAIM TERM #1 | |
|---|---|
| "plural antennas for communicating with communicators along plural wireless communications networks" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "two or more antennas for sending and/or receiving wireless signals to/from communications devices over the plural wireless communications networks" | Indefinite as to "communicators."<br>Alternatively, "two or more antennas for communicating with communicators, wherein one antenna corresponds to each selected wireless communications network" |
| **CONSTRUCTION** | |
| "two or more antennas for sending and/or receiving wireless signals to/from communications devices over the plural wireless communications networks" | |

The term "plural antennas for communicating with communicators along plural wireless communications networks" appears in each independent claim of the '837 patent (claims 1, 3, 5, and 7). The claims recite a "plurality of remote units" each comprising "plural antennas for communicating with communicators along plural wireless communications networks."[31]

The parties raise two disputes as to the plural antennas. First, SOLiD contends that the term "communicators" is indefinite. Second, SOLiD seeks to limit the term to provide that one antenna must correspond with each wireless network.

The term "communicators" is not indefinite. SOLiD contends that the term "communicators" is indefinite because "it may refer either to humans or to devices."[32] SOLiD cites to a dictionary definition of "communicators" which suggests that, in Great Britain, a

[31] Docket No. 177-1 at col.6 ll.44-47.

[32] Docket No. 188 at 5.

"communicator" is a "name for a telebusiness agent. A communicator is called a telemarketer in North America."[33] SOLiD also argues that Figure 1 of the '837 patent shows that both people and devices can be "communicators."

SOLiD's argument is not persuasive. The term "communicators" clearly refers to devices, not humans. First, the specification of the '837 patent discusses sending and receiving wireless signals to "subscriber units such as cellular telephones 32 and pagers 34."[34] The '837 patent never suggests that humans could send and receive wireless signals. Second, while SOLiD's dictionary suggests that a communicator is a British term for telemarketer, the '837 patent obviously is not claiming telemarketers communicating with antennas.[35] One of ordinary skill in the art would understand with reasonable certainty that "communicators" are devices.

As such, Corning's substitution of "communications devices" is appropriate to capture the scope of "communicators." The '837 patent discloses pagers and cellphones as exemplary devices but is not limited to those devices.[36] Accordingly, the phrase "communications devices" would cover devices that wirelessly communicate with antennas.

As to the second dispute, the claims are not limited to a one-antenna-per-network embodiment. SOLiD proposes a construction that "require[s] this 1 to 1 correspondence that in the remote unit there be effectively a dedicated antenna for each network."[37] Corning responds that the meaning of the term is not so limited and could encompass remote units that contain antennas that service more than one network, or multiple antennas per network.

Turning first to the claim language, nothing in the claims explicitly requires a one-to-one correspondence between networks and antennas. SOLiD argues that such a correspondence is required by implication because the base unit and remote unit "mirror" each other.[38] SOLiD points

[33] Docket No. 177-3 at 4.

[34] Docket No. 177-1 at col.4 ll.7-9.

[35] *See* Docket No. 177-3.

[36] *See* Docket No. 177-1 at col.4 ll.7-8.

[37] Docket. No. 201 at 58:18-21.

[38] *See* Docket. No. 188 at 6.

out that the "base unit" comprises "a communications interface for communicating with plural wireless communications networks," and the "remote units" comprise "plural antennas for communicating . . . along plural wireless communications networks."[39] The claims also require a "splitter" and a "combiner" for splitting/combining "communications signals received from said plural wireless communications networks."[40] SOLiD concludes that "unless separate network signals are supplied to separate antennas (not corresponding to other networks), a person of ordinary skill in the art would conclude that the recited 'splitter' 'combiner' [sic] make no technical sense."[41]

Although the claims certainly *could* work in a one-network-per-antenna configuration, there is no one-to-one requirement in the '837 Patent. The inventions might also work in a two-network-per-antenna, or one-network-per-two-antenna, configuration. For example, each remote unit could have two GSM antennas, or each remote unit could have a combination pager/satellite antenna. Nothing in the claims requires that each wireless communications network signal be sent to one, and only one, antenna. Indeed, the "splitter" in the remote unit simply "suppl[ies]" the communications signals to the antennas. The claims say nothing about directing each signal to only one antenna.

Finding that the claims do not limit the invention to a one-antenna-per-network embodiment, the court next looks to the specification of the '837 patent. The specification discloses a preferred embodiment of "a typical system" with "PCS, GSM and other wireless telephone and radio services as well as paging services, each communicat[ing] via an appropriate antenna."[42] Figure 2 shows a remote unit with three antennas "for PCS, GSM and paging networks respectively."[43] The preferred embodiment thus supports SOLiD's construction. But the

[39] *See e.g.*, Docket No. 177-1 at col.6 ll.18-20; col.6 ll.44-47.

[40] *Id.* at col.6 ll.17-50.

[41] Docket No. 188 at 6.

[42] Docket No. 177-1 at col.3 ll.36-40.

[43] *Id. at* col. 3 l.66.

specification does not indicate that its embodiments are limiting and instead concludes with the typical boilerplate language to the effect that "[i]t will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described hereinabove."[44] Indeed, "it is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited."[45]

Finally, SOLiD makes a passing reference to the '837 patent's prosecution history.[46] In discussing a prior art reference, the patent examiner stated that "[i]t is inherent that the [wireless communications] signals are combined and split in order to be transmitted and received by different antennas . . . In that [the prior art reference] uses different antennas for the different types of signals, it would have been obvious to use different frequencies for the different signals in order to provide plural signals without interference."[47] It is not clear how this conclusory analysis could limit the claims. "Unless altering claim language to escape an examiner rejection, a patent applicant only limits claims during prosecution by clearly disavowing claim coverage."[48] Here, the examiner's characterization of the prior art does not constitute an explicit disavowal of claim scope as required to limit claim terms beyond their plain and ordinary meaning.

Having considered the claim language, specification and prosecution history relating to the term "plural antennas for communicating with communicators along plural wireless communications networks," the court adopts the construction supplied by Corning: "two or more

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[44] *Id.* at col.6 ll.11-13.

[45] *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004); *Prima Tek II, L.L.C. v. Polypap, S.A.R.L.*, 318 F.3d 1143, 1148 (Fed. Cir. 2003) ("the mere fact that the patent drawings depict a particular embodiment of the patent does not operate to limit the claims to that specific configuration.").

[46] *See* Docket No. 188 at 7 n.9.

[47] Docket No. 189-4 at 2.

[48] *York Products, Inc. v. Central Tractor Farm & Family Center*, 99 F.3d 1568, 1575 (Fed.Cir.1996).

antennas for sending and/or receiving wireless signals to/from communications devices over the plural wireless communications networks."

**B. Issue #2: The "Low Frequency" Terms**

| **CLAIM TERM #2** | |
|---|---|
| "wherein a low frequency control signal is multiplexed by said communications interface onto said optical fiber" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "a low frequency control signal is a signal used to convey control information and having a lower frequency than the analog communications signals; the communications interface includes the device(s) and/or circuitry that multiplex(es) the low frequency control signal with another signal to be transmitted on the optical fiber" | Indefinite as to "low frequency control signal"<br>Alternatively, "wherein the communications interface actually multiplexes onto the optical fiber a control signal having frequency on the order of 10KHz" |
| **CONSTRUCTION** | |
| "a low frequency control signal is a signal used to convey control information and having a lower frequency than the analog communications signals; the communications interface includes the device(s) and/or circuitry that multiplex(es) the low frequency control signal with another signal to be transmitted on the optical fiber" | |

| **CLAIM TERM #3** | |
|---|---|
| "wherein a low frequency data signal is multiplexed by said communications interface to a microprocessor" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "a low frequency data signal is a signal used to convey data and having a lower frequency than the analog communications signals; the communications interface includes the device(s) and/or circuitry that multiplex(es) the low frequency data signal with another signal to be transmitted to a microprocessor." | Indefinite as to "low frequency data signal"<br>Alternatively, "wherein the communications interface actually multiplexes to a microprocessor a data signal having a rate on the order of 10Kbit/sec." |
| **CONSTRUCTION** | |
| "a low frequency data signal is a signal used to convey data and having a lower frequency than the analog communications signals; the communications interface includes the device(s) and/or circuitry that multiplex(es) the low frequency data signal with another signal to be transmitted to a microprocessor." | |

The term "wherein a low frequency control signal is multiplexed by said communications interface onto said optical fiber" appears in claim 1 of the '837 patent. Claim 1 recites a

"communications station" comprising a base unit and a plurality of remote units connected by an optical fiber, "wherein a low frequency control signal is multiplexed by said communications interface onto said optical fiber for providing loop back alarm status of each remote unit and for providing control signals thereto, which control amplifier gain and balance thereof."[49]

The term "wherein a low frequency data signal is multiplexed by said communications interface to a microprocessor" appears in claim 3 of the '837 patent. Claim 3 recites a "communications station" comprising a base unit and a plurality of remote units connected by an optical fiber, "wherein a low frequency data signal is multiplexed by said communications interface to a microprocessor for providing loop back alarm status of each remote unit and for providing control signals thereto, which control amplifier gain and balance thereof."[50]

The parties raise two disputes. First, SOLiD contends that "low frequency control signal" is an indefinite term of degree. Second, the parties disputes whether "low frequency" means "on the order of [10KHz or 10Kbit/sec]" (SOLiD's proposal) or "having a lower frequency than the analog communications signals" (Corning's proposal). The parties do not present any argument specific to the "low frequency data signal" versus the "low frequency control signal."[51]

As to the first dispute, "low frequency control signal" is not indefinite.[52] SOLiD's expert Dr. Acampora may believe that "a person of ordinary skill in the art reviewing the '837 patent would not have been able to give this term a practical meaning."[53] But to accept this would be to accept that all terms of degree, here "low", are indefinite under *Nautilus.*[54] That is not the case. As the Federal Circuit has explained:

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[49] Docket No. 177-1 at col. 7 ll.1-5.

[50] Docket No. 177-1 at col. 7 ll.60-64.

[51] *See* Docket No. 176 at 11; Docket No. 188 at 8-10.

[52] *See* Docket No. 188 at 9.

[53] Docket No. 189-3 at ¶ 72.

[54] *See Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014).

> We do not understand the Supreme Court to have implied in *Nautilus*, and we do not hold today, that terms of degree are inherently indefinite. Claim language employing terms of degree has long been found definite where it provided enough certainty to one of skill in the art when read in the context of the invention.[55]

Here, when read in the context of the invention, one of ordinary skill in the art could ascertain, with reasonable certainty, the meaning of "low frequency control signal."

First, claim 1 provides that "a single radio frequency analog output" is converted to a "corresponding optical output" that is then transmitted to the remote units.[56] As the "single radio frequency analog output" and the "low frequency control signal" are the only two claimed signals being sent to the remote units in the optical output, the control signal is clearly of a lower frequency than the RF analog output.

Claim 1 of the '837 patent also ascribes particular functions to the low frequency control signal, giving further context to the term. Specifically, the "low frequency control signal" must perform two functions: (1) provide "loop back alarm status" to the remote units and (2) provide "control signals" to the remote units.[57] The combined communications and control signal is sent to the remote unit via the optical fiber, and then the remote unit must split the communications signals from the control signal and transmit the communications signals via the remote units' antennae.[58] One of ordinary skill in the art therefore would recognize that the control signal is defined with reference to the RF analog output and that the control signal must be sufficiently distinct from the RF analog output to perform the claimed functions.

Second, the '837 patent's specification provides an example of how the low frequency control signal is used in an exemplary embodiment:

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[55] *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1370 (Fed. Cir. 2014).

[56] Docket No. 177-1 at col.6. ll.32.

[57] *Id.* at col.7 ll.1-4.

[58] *See id.* at col.6 ll. 17-61 (claiming a remote unit with a "fiberoptic receiver receiving an optical input and providing an RF analog output to said received communications splitter containing previously received transmit analog communications signals" and a splitter "for splitting previously combined received analog communications signals from said base unit and supplying them to said plural antennas").

> Microprocessor 200 provides gain control signals to the remote units via a D/A converter 208 and a loop back signal generator 210. Loop back signal generator 210 preferably operates at approximately 10 KHz.[59]

Figure 3 shows a low frequency control signal, or "pilot tone" of 10KHz, being combined with three network communications signals (Paging, GSM and PCS), for conversion to an optical output and then transmission to the remote units.[60] Figure 3 also shows exemplary frequencies ascribed to each communications network: 275-285 MHz for paging; 935-960 MHz for GSM and 1930-1990 MHz for PCS.[61] The parties do not dispute that various wireless networks have well-known frequency ranges.[62] A 10KHz (or 0.01 MHz) "pilot tone" has a lower frequency than each of the exemplary wireless communications networks.

Third, SOLiD's expert recognizes that "low frequency" can be defined by reference to another signal. Acampora opined that a low frequency control signal would be definite if the '837 patent provided "either a signal frequency *or a reference with respect to which a control signal has 'low frequency.'*"[63] As explained above, the '837 patent does describe the control signal with reference to the communications network signal, as shown in the language of claim and in Figure 3. Accordingly, the court finds that one of ordinary skill in the art could reasonably ascertain the meaning of a "low frequency control signal."

As to the second dispute, "low frequency" is not limited to 10KHz or 10Kbit/sec, as SOLiD suggests. As explained above, the court agrees with Corning that a low frequency control signal is defined with respect to the analog communications signals. The claim language supports this construction, as the low frequency control signal and the "single radio frequency analog output" are the only claimed signals that are sent to the remote units. In other words, the only other signal

[59] *Id.* at col.5 ll.62-65.

[60] *See Id.* at col.4 ll.25-28.

[61] *See Id.* at Fig. 3.

[62] *See* Docket No. 176 at 9.

[63] Docket No. 189-3 at ¶ 68.

that could possibly serve as a reference to the low frequency control signal is the analog communications signals.

In contrast, nothing in the claim language suggests that the control signal is limited to a signal "on the order of 10KHz." Although the '837 patent's specification discloses a 10KHz control signal,[64] that embodiment is only exemplary. "[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited."[65] SOLiD does not point to any support in the intrinsic record suggesting that the patentee limited the low frequency control signal to a signal on the order of 10KHz. Accordingly, the court adopts Corning's construction.

### C. Issue #3: The "Fiberoptic" Transmitter/Receiver Terms

| **CLAIM TERM #4** | |
|---|---|
| "fiberoptic transmitter receiving said [single/combined] radio frequency analog output and providing a corresponding optical output" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| Plain and ordinary meaning | Fiberoptic transmitted actually receiving said [single/combined] radio frequency analog output and actually providing a corresponding optical output |
| **CONSTRUCTION** | |
| Plain and ordinary meaning | |

[64] *See, e.g.*, Docket No. 177-1 at Figure 3.

[65] *Liebel-Flarsheim*, 358 F.3d at 913; *Prima Tek II*, 318 F.3d at 1148 ("the mere fact that the patent drawings depict a particular embodiment of the patent does not operate to limit the claims to that specific configuration.").

| CLAIM TERM #5 | |
|---|---|
| "fiberoptic receiver receiving an optical input and providing an RF analog output" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| Plain and ordinary meaning | Fiberoptic receiver actually receiving an optical input and actually providing an RF analog output |
| **CONSTRUCTION** | |
| Plain and ordinary meaning | |

The terms "fiberoptic transmitter receiving said [single/combined] radio frequency analog output and providing a corresponding optical output" and "fiberoptic receiver receiving an optical input and providing an RF analog output" appear in each independent claim of the '837 patent (claims 1, 3, 5 and 7). Each claim is a system claim, comprising a base unit and a plurality of remote units. The claims require a base unit comprising "fiberoptic transmitter receiving said single radio frequency analog output and providing a corresponding optical output," and "fiberoptic receiver receiving said single radio frequency analog output and providing a corresponding optical output." The claims also recite a plurality of remote units, each comprising "a fiberoptic transmitter receiving said combined radio frequency analog output and providing a corresponding optical output," as well as "a fiberoptic receiver receiving an optical input and providing an RF analog output."[66]

SOLiD contends that the terms at issue require performance of a method step, thus rendering the claims invalid as indefinite under 35 U.S.C. § 112 ¶ 2.[67] The parties do not make any arguments specific to "fiberoptic transmitter" versus the "fiberoptic receiver."[68]

A single claim that covers both an apparatus and a method of use is indefinite and therefore invalid under 35 U.S.C. § 112 ¶ 2.[69] In *IPXL*, the Federal Circuit found that "such a claim is not

[66] *See, e.g.*, Docket No. 177-1 at col.6 ll.17-68.

[67] *See* Docket No. 188 at 11.

[68] *See* Docket No. 176 at 8; Docket No. 188 at 10.

[69] *See IPXL Holdings, LLC v. Amazon.com, Inc.*, 430 F.3d 1377 (Fed.Cir.2005).

sufficiently precise to provide competitors with an accurate determination of the 'metes and bounds' of protection involved and is ambiguous and properly rejected under section 112, paragraph 2." [70]

The claim invalidated in *IPXL* read:

> 25. The *system of claim 2* [including an input means] wherein the predicted transaction information comprises both a transaction type and transaction parameters associated with that transaction type, and the *user uses the input means* to either change the predicted transaction information or accept the displayed transaction type and transaction parameters.[71]

The Federal Circuit held the claim invalid because "it is unclear whether infringement of claim 25 occurs when one creates a system that allows the user to change the predicted transaction information or accept the displayed transaction, or whether infringement occurs when the user actually uses the input means to change transaction information or uses the input means to accept a displayed transaction."[72]

Here, SOLiD contends that the use of the terms "receiving" and "transmitting" render the system claims invalid. SOLiD points to *Rembrandt Data Technologies, LP v. AOL, LLC*, in arguing that the terms should be interpreted as requiring an affirmative method step.[73] In *Rembrandt*, the claim recited:

> 3. A data transmitting device for transmitting signals corresponding to an incoming stream of bits, comprising:
>
> first buffer means for partitioning said stream into frames of unequal number of bits and for separating the bits of each frame into a first group and a second group of bits;
>
> fractional encoding means for receiving the first group of bits of each frame and performing fractional encoding to generate a group of fractionally encoded bits;
>
> second buffer means for combining said second group of bits with said group of fractionally encoded bits to form frames of equal number of bits;

[70] *Id.* at 1384 (citation and quotation omitted).

[71] *Id.* (emphasis and brackets in opinion).

[72] *Id.*

[73] *See* Docket No. 188 at 12, citing 641 F.3d 1331 (Fed. Cir. 2011).

> trellis encoding means for trellis encoding the frames from said second buffer means; and
>
> *transmitting the trellis encoded frames.*[74]

The Federal Circuit held that the final limitation, "transmitting the trellis encoded frames," was a method step and invalidated the claim under *IPXL's* reasoning.[75]

*Rembrandt* is distinguishable because the "transmitting" limitation was claimed as an affirmative step, rather than as a function that the system or a component thereof could perform. The claims at issue here do not call out affirmative steps that must be taken to infringe, as in *IPXL*.[76] The transmitting and receiving functions are tied to a specific component of the system, namely either the base unit or the remote unit. Each unit contains a fiberoptic transmitter and a fiberoptic receiver, which perform the specified transmitting and receiving functions. Infringement of the claims occurs when "one creates a system that allows the user [to perform the claimed functions]."[77]

SOLiD points out that the patentee used phrases like "for combining" and "for splitting" in other parts of the claims, suggesting that the patentee distinguished between functional limitations and method steps.[78] As SOLiD acknowledges, the use of functional language does not automatically convert the claims into method claims.[79] Furthermore, there is no requirement that the patentee use the phrase "*for* doing something" to properly recite a functional limitation. The Federal Circuit has not adopted a strict test for separating functional language from improper

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[74] *Id.* at 1339 (emphasis added).

[75] *See id.*

[76] *See IPXL*, 430 F.3d at 1384 (system claim included limitation that "the user uses the input means").

[77] *Id.*

[78] *See* Docket No. 188 at 11.

[79] *See, e.g., Apple, Inc. v. Samsung Elecs. Co., Ltd.*, 876 F. Supp. 2d 1141, 1150–1151 (N.D. Cal. 2012).

method-step language. Instead, the Federal Circuit has held that claims reciting a function without any modifiers (like "for") are valid and merely recite functional limitations.[80]

For example, in *Microprocessor Enhancement*, the Federal Circuit held that the following claim was not invalid:

> 7. A pipelined processor for executing instructions comprising:
>
> a conditional execution decision logic pipeline stage, a[t] least one instruction execution pipeline stage prior to said conditional execution decision logic pipeline stage;
>
> at least one condition code;
>
> said instructions including branch instructions and non-branch instructions and including opcodes specifying operations, operand specifiers specifying operands, and conditional execution specifiers;
>
> ...
>
> *the conditional execution decision logic pipeline stage, when specified by the conditional execution specifier, determining the enable-write using the boolean algebraic evaluation*;
>
> writing means for writing said non-branch instruction results to a destination specified by the operand specifiers and writing to the condition code when specified, if enable-write is true; and
>
> said writing means further for discarding or not writing the non-branch instruction results and discarding or not writing the condition code, if enable-write is false.[81]

The italicized portion of the apparatus claim includes functional limitations and uses the term "determining" in contrast to "for determining," "capable of determining," or "configured to determine," etc. Nonetheless, the Federal Circuit again applied the *IPXL* and *Rembrandt* methodology, emphasizing that the claims place the public on notice of when infringement occurs:

> [C]laim 7 does not cover both an apparatus and a method of use of that apparatus. As this court recently stated, apparatus claims are not necessarily indefinite for using functional language. Indeed, functional language in a means-plus-function format is explicitly authorized by statute. Functional language may also be employed to limit the claims without using the means-plus-function format.

[80] *See Microprocessor Enhancement Corp. v. Texas Instruments, Inc.*, 520 F.3d 1367 (Fed. Cir. 2008); *see also CSB–Sys. Int'l Inc. v. SAP Am., Inc.*, 864 F. Supp. 2d 335, 351 (E.D. Pa. 2012) ("The mere fact that the claims failed to use the terminology 'capable of' or 'intended to' prior to the active terms does not amount to a fatal flaw comparable to that in *Rembrandt*.").

[81] *Id.* at 1371-72 (emphasis added).

> Moreover, where the claim uses functional language but recites insufficient structure, § 112, ¶ 6 may apply despite the lack of "means for" language. Notwithstanding these permissible instances, the use of functional language in a claim may "fail 'to provide a clear-cut indication of the scope of subject matter embraced by the claim' and thus can be indefinite." Claim 7 of the '593 patent, however, is clearly limited to a pipelined processor possessing the recited structure and capable of performing the recited functions, and is thus not indefinite under *IPXL Holdings*.[82]

The same analysis applies here. The independent claims of the '837 patent require fiberoptic transmitters and receivers capable of performing certain functions, and do not require the carrying out of any affirmative method steps. Therefore, the claims are not invalid under § 112. As neither party proposes a construction beyond the terms' plain and ordinary meaning, the court does not further construe them.

**D. Issue #4: "soft limiter"**

| **CLAIM TERM #6** | |
|---|---|
| "soft limiter for substantially preventing distortion due to an inadvertent increase in communication power" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "device(s) and/or circuitry for reducing a signal's power without substantially distorting the information conveyed by the signal" | Indefinite, as this claim element is not connected to any other component of the claimed communications station<br>Indefinite as to what type of distortion is "substantially prevented" and what measure is applied to determine if such distortion was "substantially prevented"<br>Indefinite as to "soft limiter" |
| **CONSTRUCTION** | |
| "device(s) and/or circuitry for reducing a signal's power without substantially distorting the information conveyed by the signal" | |

The term "soft limiter for substantially preventing distortion due to an inadvertent increase in communication power" appears in claim 7 of the '837 patent. As with the other independent claims of the '837 patent, claim 7 recites a base unit and a plurality of remote units connected via

[82] *Id.* 1375 (citations omitted).

fiberoptic cables.[83] Claim 7 then concludes with the limitation "a soft limiter for substantially preventing distortion due to an inadvertent increase in communication power."

SOLiD argues that the "soft limiter" term is indefinite in three respects: (1) it is not clear whether the soft limiter is part of the base unit or the remote unit; (2) one of ordinary skill would not be able to tell whether distortion was "substantially prevented" and (3) one of ordinary skill would not know how distortion is limited.[84] Each of SOLiD's arguments is essentially an attack on the breadth of the claim, not on the ability of one of ordinary skill to determine the scope of the claim. "[B]readth is not indefiniteness."[85]

First, there is no requirement that a claim describe the exact relationship between each component of a device.[86] Here, the soft limiter could indeed be part of the remote unit or the base unit, or simply a part of the claimed "communications station." The '837 patent's specification further supports the interpretation that a soft limiter could be associated with either the base station or the remote unit:

> Reference is now made to FIG. 4 which illustrates a soft limiter 100, constructed and operative in accordance with a preferred embodiment of the present invention. At the uplink, one or more mobile telephones situated very close to the remote antenna may overdrive laser diode 60. Soft limiter 100 may be used at the uplink to prevent laser diode 60 from being overdriven, and thereby prevent non-linear distortion in all of the services distributed. At the downlink, soft limiter 100 protects any of the wireless services from inadvertently increasing input power to base unit 10.
>
> Soft limiter 100 preferably includes a switched attenuator 102, a comparator 104 and an RF power level detector 106, as shown in FIG. 4.[87]

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[83] *See* Docket No. 177-1 at col.8 l.60-col.10 l.23.

[84] *See* Docket No. 188 at 12.

[85] *SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1341 (Fed. Cir. 2005) (quotation and citation omitted).

[86] *See Ultimax Cement Mfg. Corp. v. CTS Cement Mfg. Corp.*, 587 F.3d 1339, 1352 (Fed. Cir. 2009) ("Merely claiming broadly" does not "prevent the public from understanding the scope of the patent."); *SmithKline Beecham*, 403 F.3d at 1341 ("[B]readth is not indefiniteness." (quotation and citation omitted)).

[87] Docket No. 177-1 at col.4 ll.42-54.

The possibility that the soft limiter could be part of the base unit or the remote unit does not render the claim invalid; the claim simply covers both possibilities.[88]

Second, claim 7 of the '837 patent and the description of the soft limiter in the specification allow one of ordinary skill in the art to determine, with reasonable certainty, the scope of the claims.[89] The claim itself defines what type of distortion is substantially prevented: "distortion due to an inadvertent increase in communication power."[90]

Acampora acknowledges that the '837 patent explains that the soft limiter "prevent[s] non-linear distortion," but opines that this description "is not very helpful."[91] Acampora does, however, accept that "[i]n the context of the '837 patent, nonlinear distortion relates to an unacceptably large input causing distortion to an output arising from the nonlinear relationship between the input and an output."[92] He then provides several examples of soft limiters that could substantially prevent non-linear distortion.[93] Although Acampora points to several ways to measure distortion due to an increase in power, the specific method of measuring distortion is not relevant to understanding the scope of the claims.[94]

Acampora also concludes that "the patent provides no guidance as to the metric of how one may ensure that distortion is 'substantially prevented.'"[95] But there is no requirement that the term "substantially prevented" be defined with mathematical precision.[96] Because SOLiD and

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[88] *Ultimax Cement*, 587 F.3d at 1352 ("Merely claiming broadly" does not "prevent the public from understanding the scope of the patent."); *SmithKline Beecham*, 403 F.3d at 1341 ("[B]readth is not indefiniteness." (quotation and citation omitted)).

[89] *See Nautilus*, 134 S. Ct. at 2124.

[90] Docket No. 177-1 at col.10 ll.21-22.

[91] Docket No. 189-3 ¶ 96.

[92] *Id.* at ¶ 97.

[93] *See id.* at ¶¶ 99-102.

[94] *See Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1575–76 (Fed. Cir. 1986).

[95] Docket No. 189-3 ¶ 103.

[96] *See Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1335 (Fed. Cir. 2010); *Nautilus*, 134 S.Ct. at 2124.

Acampora have merely identified issues of claim breadth, the court finds that the term "soft limiter for substantially preventing distortion due to an inadvertent increase in communication power" is not indefinite. The court adopts Corning's proposed construction.

**E. Issue #5: "single duplex cable"**

| **CLAIM TERM #7** | |
|---|---|
| "wherein a single duplex cable interconnects each of said antennas with said communications interface" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "part of the signal path between the communications interface and each antenna includes at least one duplex cable" | Indefinite as to "duplex cable".<br><br>Alternatively, "wherein a single cable that is operated in bidirectional mode interconnects each of said antennas with said communications interface" |
| **CONSTRUCTION** | |
| "wherein a single cable that allows transmission in both directions interconnects each of said antennas with said communications interface" | |

The term "wherein a single duplex cable interconnects each of said antennas with said communications interface" appears in claims 2, 4, 6, and 8 of the '837 patent. Whereas the independent claims recite "first" and "second" optical fibers connecting the base unit and the remote unit, dependent claims 2, 4, 6, and 8 require that "a single duplex cable interconnects each of said antennas with said communications interface."[97] The "communications interface" is part of the base unit.[98]

The parties raise two disputes with respect to the term single duplex cable. First, SOLiD contends that the term is indefinite, "because until the cable is operated one cannot tell if a cable—basically a piece of wire or a strand of fiber—is a 'duplex' cable."[99] Second, the parties dispute

[97] *See, e.g.*, Docket No. 177-1 at col.7 ll.6-8 (claim 2).

[98] *See id.* col.6 ll.18-20 (claim 1: "a base unit comprising: a communications interface for communicating with plural wireless communications networks . . .").

[99] Docket No. 188 at 14.

whether the cable extends from each antenna to the communications interface, or simply makes up "part of the signal path" between each antenna and the communications interface.

As to the first issue, the term "duplex cable" is not indefinite. There is no dispute as to the scope of the term "duplex cable." Acampora recognizes that a duplex cable must send and receive information.[100] SOLiD nonetheless argues that one cannot determine infringement until the device is operated. This is essentially the same *IPXL* argument the court rejected above.

As to the second issue, the duplex cable indeed extends from each antenna to the communications interface. The claim language resolves this dispute in SOLiD's favor. Again, the term to be construed is "wherein a single duplex cable interconnects each of said antennas with said communications interface." There is no suggestion in the claim language or the specification that "interconnects" means something less than the path between two elements.[101] Accordingly, the court gives the term "wherein a single duplex cable interconnects each of said antennas with said communications interface" its plain and ordinary meaning.

## IV.

The parties request construction of a total of seven claim terms as to the '504 patent. The court construes the terms as follows.

### A. Issue #1: "MIMO" signals

| **CLAIM TERM #1** | |
|---|---|
| "multiple input multiple output (MIMO) signals" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "multiple signals that have overlapping frequency spectrums and that are transmitted and/or received by separate antennas with overlapping coverage areas" | "multiple signals having the same or overlapping spectrum, each signal carrying a different data stream" |

[100] *See* Docket No. 189-3 ¶ 108 (citing Docket No. 177-1 at col.4 ll.9-13).

[101] The court notes that the antenna is disclosed as connected to various circuitry (splitter, combiner, fiberoptic transmitter, fiberoptic receiver) within the remote unit. *See, e.g.*, Docket No. 177-1 at Fig. 2.

| CONSTRUCTION |
| --- |
| "multiple signals that have overlapping frequency spectrums and that are transmitted and/or received by separate antennas with overlapping coverage areas and that carry a different data stream" |

The term "multiple input multiple output (MIMO) signals" appears in the sole independent claim of the '504 patent. Claim 1 requires:

> 1. A method for propagating multiple input multiple output (MIMO) over a distributed antenna system (DAS) network, comprising the steps of:
>
> a) providing a plurality n of original MIMO signals;
>
> b) at a first endpoint of the DAS network, frequency shifting n−1 of the MIMO signals into signals with n−1 separate frequencies, with one MIMO signal left un-shifted in frequency;
>
> c) propagating the n−1 frequency shifted signals and the un-shifted frequency signal together over a single coaxial cable extending for at least part of a path from the first endpoint to a second endpoint of the DAS network; and
>
> d) at the second endpoint, reconstructing the original MIMO signals.[102]

The parties agree that "MIMO signals" are multiple signals with the same or overlapping frequency spectrum.[103]

The parties also agree that MIMO signals are transmitted and/or received by separate antennas with overlapping coverage areas. Acampora explains that "'MIMO' is a communication technology that uses multiple antennas at both the transmitter and the receiver ends of a radio link to communicate, in parallel, multiple signals, all of them in the same frequency band, but each carrying a different data stream."[104] The '504 patent also explains that "MIMO technology is based on reception and transmission of signals that share the same spectrum, through two or more co-located antennas."[105]

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[102] Docket No. 177-2 at col.10 ll.8-22.

[103] The court notes that an "overlapping" spectrum encompasses signals that have the "same" spectrum.

[104] Docket No. 189-3 ¶ 45.

[105] Docket No. 177-2 at col.1 ll.43-45.

The parties dispute whether each signal must carry a different data stream. The court agrees with SOLiD that MIMO signals must carry different data streams. The '504 patent explains that the invention is directed to "[m]ethods and systems for carrying *different signals* required for MIMO communication."[106] The '504 patent further describes MIMO technology as "a technology in which each antenna location includes multiple antennas that *process different data streams* at the same frequency."[107] Corning argues that these statements are "true, but not limiting."[108] But if, as Corning apparently concedes, MIMO technology processes different data streams at the same frequency, then MIMO signals necessarily "have overlapping frequency spectrums and . . . carry a different data stream" as per SOLiD's proposed construction.

Accordingly, because both parties' proposals include necessary limitations to defining MIMO signals, the court construes the term as "multiple signals that have overlapping frequency spectrums and that are transmitted and/or received by separate antennas with overlapping coverage areas and that carry a different data stream."

### B. Issue #2: "endpoint" of a DAS network

| **CLAIM TERM #2** | |
|---|---|
| "endpoint [of a DAS network]" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "an end of the DAS network that is associated with either a master unit or a remote unit" | "(1) antenna location [of a DAS network] communicating with end users ("antenna endpoint"), or (2) distribution location [of a DAS network] where signals are received from a radio service(s) source and processed signals are distributed to at least one antenna location ("distribution endpoint")" |

[106] *Id.* at Abstract (emphasis added).

[107] *Id.* at col.1 ll.42-47 (emphasis added).

[108] Docket No. 176 at 16.

| CONSTRUCTION |
| --- |
| "(1) antenna location [of a DAS network] communicating with end users ("antenna endpoint"), or (2) distribution location [of a DAS network] where signals are received from a radio service(s) source and processed signals are distributed to at least one antenna location ("distribution endpoint")" |

The term "endpoint" of the DAS network appears in claim 1 of the '504 patent, which claims a method of propagating MIMO signals between a "first endpoint" and a "second endpoint."[109] Dependent claim 3 covers signal propagation in the downlink direction, specifying that "the first endpoint includes a master unit, wherein the second endpoint includes a remote unit."[110] Dependent claim 6 covers an uplink, specifying that "the first endpoint is a remote unit and wherein the second endpoint is a master unit."[111]

The parties dispute whether the claimed endpoints are limited to an "antenna endpoint" and a "distribution endpoint," as SOLiD proposes, or are simply "associated with either a master unit or a remote unit," as Corning proposes. SOLiD's proposal reflects the meaning of the term "endpoint" as it is used in the '504 patent.

The court begins by noting that there is actually significant overlap between the two proposed constructions.[112] Corning's construction uses the terms "remote unit" and "master unit," while SOLiD uses "antenna endpoint" and "distribution endpoint." Those terms describe the same components, respectively. Corning's criticism that SOLiD's construction improperly imports structure from the specification therefore is not well-taken; Corning's construction essentially

[109] Docket No. 177-2 at col.10 ll.8-22.

[110] *Id.* at col.10 ll.26-28.

[111] *Id.* at col.10 ll.43-44.

[112] *See* Docket No. 201 at 143:15-21 (The court, addressing Corning's counsel: "Looking at your construction and comparing it to the defendant's[,] your construction makes clear that the end of the network can be either the end associated with master or the end associated with remote. As I look at SOLiD's proposal, it seems they are saying essentially the same thing using different words."); *id.* at 145:3-4 ("So am I really getting much by picking one [construction] over the other is what I'm trying to figure out here.").

describes the same thing as SOLiD's.[113] Corning admitted as much at the *Markman* hearing, stating the two constructions "would be fairly close[, but] I'm not sure it's exactly the same."[114]

The specification describes the invention as "methods and systems for carrying different signals required for MIMO communication using a single coaxial cable between two endpoints of a DAS, e.g. between a distribution point and each of the antenna locations."[115] The "master unit" "is the unit to which the signals of the services are interfaced" and is "connected (directly or indirectly) to the radio equipment which generates the original signals and demodulates the received signals."[116] The master unit thus is the "distribution point." Second, the "remote unit" "is the unit to which the antennas are connected."[117] The "remote unit" therefore is the "antenna locations." And, "[i]n the terminology used herein, the Master unit is associated with one endpoint while the Remote unit is associated with another endpoint of the DAS network."[118]

SOLiD's construction properly captures how the '504 patent itselfs describes the two endpoints. Using terms like "master unit" will not assist the jury in applying the claims to the accused products, because a "master unit" is actually less likely to be understood by a lay jury than "endpoint." Furthermore, it is clear from the specification that a master unit is a distribution endpoint where "where signals are received from a radio service(s) source and processed signals are distributed to at least one antenna location."[119] Similarly, the specification equates the remote unit and antenna locations.[120] Accordingly, the court adopts SOLiD's construction.

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[113] *See* Docket No. 176 at 18.

[114] Docket No. 201 at 145:12-13.

[115] Docket No. 177-2 at col.1 ll.62-67.

[116] *Id.* at col.3 ll.61-62; col.4 ll.10-13.

[117] *Id.* at col.3 ll.62-63.

[118] *Id.* at col.4 ll.5-7.

[119] Docket No. 188 at 17.

[120] Docket No. 177-2 at col.3 ll.62-63.

### C. Issue #3: The "plurality n" and "n-1" terms

| CLAIM TERM #3 | |
|---|---|
| "frequency shifting n-1 of the MIMO signals into signals with n-1 separate frequencies" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "changing the frequency of n-1 of the MIMO signals, each to a different frequency, to create n-1 frequency shifted signals" | "frequency shifting n-1 ($n \geq 3$) of the MIMO signals into signals with n-1 ($n \geq 3$) separate frequencies" |
| **CONSTRUCTION** | |
| "changing the frequency of n-1 of the MIMO signals, each to a different frequency, to create n-1 frequency shifted signals" | |

| CLAIM TERM #4 | |
|---|---|
| "providing a plurality n of original MIMO signals" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "providing a number (n) o MIMO signals, where n is two or more" | "providing a number (n) of MIMO signals, where n is three or more" |
| **CONSTRUCTION** | |
| "providing a number (n) of MIMO signals, where n is two or more" | |

| CLAIM TERM #5 | |
|---|---|
| "providing a plurality of MIMO signals belonging to a plurality of services" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "providing two or more MIMO signals from each of two or more services" | "providing a plurality of MIMO signals for each of two or more wireless services" |
| **CONSTRUCTION** | |
| "providing two or more MIMO signals from each of two or more services" | |

The parties dispute whether "plurality n" or "n-1" requires that n be at least two or at least three. The dispute is relevant to three claim terms found in claims 1 and 2 of the '504 patent:

> 1. A method for propagating multiple input multiple output (MIMO) over a distributed antenna system (DAS) network, comprising the steps of:

a) providing a plurality n of original MIMO signals;

b) at a first endpoint of the DAS network, frequency shifting n−1 of the MIMO signals into signals with n−1 separate frequencies, with one MIMO signal left un-shifted in frequency;

c) propagating the n−1 frequency shifted signals and the un-shifted frequency signal together over a single coaxial cable extending for at least part of a path from the first endpoint to a second endpoint of the DAS network; and

d) at the second endpoint, reconstructing the original MIMO signals.

2. The method of claim 1, wherein the step of providing a plurality of n MIMO signals includes providing a plurality of MIMO signals belonging to a plurality of services.[121]

SOLiD argues that n must be three or more; Corning takes the position that n may be two or more. SOLiD agrees that a "plurality" normally means two or more, but argues that in the context of the '504 patent n must be three or more.[122] SOLiD's argument is apparently grounded in both the grammar of the claim language and in the '504 patent's specification. Ultimately, the court agrees with Corning that the term "plurality n" should be given its plain and ordinary meaning of two or more.

SOLiD first argues that "plurality n" is different from "plurality."[123] The argument does not go far. As SOLiD admits, plurality "ordinarily means two or more." "n" is well understood to mean an integer. Accordingly, "plurality n" simply means "an integer of two or more."

SOLiD next argues that n must be three or more because claim 1 of the '504 patent recites "frequency shifting n−1 of the MIMO signals into signals with n−1 separate frequencies, with one MIMO signal left un-shifted in frequency."[124] If n=2, then the claim would read "frequency shifting [1] of the MIMO signals into signals with [1] separate frequencies, with one MIMO signal left un-shifted in frequency." SOLiD argues that "1 separate frequencies" is impossible. This is not persuasive because the n-1 shifted frequencies are separate from the 1 un-shifted frequency, even if n is only 2.

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[121] *Id.* at col.10 ll.8-25.

[122] *See* Docket No. 188 at 23 ("Ordinarily, the term 'plurality' means two or more.").

[123] *Id.*

[124] *Id.* (citing Docket No. 177-2 at col.10 ll.12-15).

Finally, SOLiD points out that each embodiment disclosed in the specification includes three input signals.[125] However, the specification does not indicate that its embodiments are limiting. Indeed, "it is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited."[126] Accordingly, the court adopts Corning's proposed constructions.

**D. Issue #4: the "single coaxial cable"**

| **CLAIM TERM #6** | |
|---|---|
| "a single coaxial cable extending for at least part of a path from the first endpoint to a second endpoint of the DAS network" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "a coaxial cable used to convey signals over at least part of a signal path from one endpoint of the DAS network to another endpoint of the DAS network" | "a single coaxial cable connected to an antenna endpoint and extending for at least part of a path to a distribution endpoint of the DAS network, for carrying both uplink and downlink signals" |
| **CONSTRUCTION** | |
| "a single coaxial cable connected to an antenna endpoint and extending for at least part of a path to a distribution endpoint of the DAS network, for carrying both uplink and downlink signals" | |

The term "a single coaxial cable extending for at least part of a path from the first endpoint to a second endpoint of the DAS network" appears in claim 1 of the '504 patent. The parties dispute (1) whether the cable must be connected to the antenna endpoint of the DAS network and (2) whether the cable must be used in both the uplink and downlink directions.

The '504 patent readily resolves the first dispute in SOLiD's favor:

> A single coaxial cable connected to each Remote unit is used to transfer the MIMO signal to and from the Remote unit. **The coaxial cable is always connected to each Remote unit.** However, in some embodiments, the coaxial cable does not necessarily extend all the way to the Master unit, but may go first to a distribution point which is connected through a coaxial or fiber cable to the Master unit.[127]

[125] *See Id.* (citing Docket No. 177-2 at Figs. 2-6 and 9; col.3 ll.4-12; col.4 ll.44-50).

[126] *Liebel-Flarsheim*, 358 F.3d at 913; *Prima Tek II*, 318 F.3d at 1148 ("the mere fact that the patent drawings depict a particular embodiment of the patent does not operate to limit the claims to that specific configuration.").

[127] Docket No. 177-2 at col.4 ll.14-21 (emphasis added).

Thus, the specification expressly requires that the coaxial cable be connected to the antenna endpoint.[128] The statement above is "not limited to describing a preferred embodiment, but more broadly describes the overall invention," and disclaims other alternatives.[129] Corning provides no persuasive counterargument.

As to the second dispute, Corning argues that "nothing in the claim language itself suggests that the same coaxial cable must be used for *both*" uplink and downlink.[130]

Claim 1 recites a method of sending signals from one endpoint of a DAS to another, via "a single coaxial cable."[131] The phrasing "a single coaxial cable" requires that there be only one cable connecting the two endpoints. The DAS of the '504 patent necessarily sends signals in both uplink and downlink directions, as the DAS is used to provide wireless communications.[132]

Finally, the '504 patent distinguishes the prior art by reference to the single coaxial cable:

> One problem with trying to implement DAS architectures with MIMO technology is the requirement to route each of the MIMO signals in a separate coaxial cable to avoid mutual interference between the signals. This may result in significant increase in the amount of coaxial cables required and may significantly increase the cost and complexity of the installation.
>
> Therefore, there is a need for and it would be advantageous to have systems and methods that supporting implementation of MIMO technology with a "conventional" DAS architecture, i.e. the use of a single coaxial cable.[133]

It is clear from the claim language and the specification of the '504 patent that there is only one coaxial cable connecting the endpoints of the DAS, and the cable extends from the antenna

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[128] As explained above, the "remote unit" is the same as the "antenna endpoint."

[129] *Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d 1340, 1348 (Fed. Cir. 2004); *GE Lighting Solutions, LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014).

[130] Docket No. 176 at 22.

[131] Docket No. 177-2 at col.10 ll.8-22.

[132] *See id.* at col.1 ll.14-17 ("The invention relates generally to wireless communication systems and services and more particularly to Multiple Input Multiple Output (MIMO) technology applied to Distributed Antenna Systems (DAS).").

[133] *Id.* at col.1 ll.48-58.

endpoint at least partway to the master unit.[134] The court therefore adopts SOLiD's construction of "a single coaxial cable connected to an antenna endpoint and extending for at least part of a path to a distribution endpoint of the DAS network, for carrying both uplink and downlink signals."

**E. Issue #5: "reconstructing the original MIMO signals"**

| **CLAIM TERM #7** | |
|---|---|
| "at the second endpoint, reconstructing the original MIMO signals" | |
| **Corning's Preferred Construction** | **SOLiD's Preferred Construction** |
| "changing the frequencies of the n-1 frequency shifted signals back to their original frequencies, at an endpoint opposite the first endpoint" | "at the second endpoint, reconstructing a replica of the original MIMO signals" |
| **CONSTRUCTION** | |
| "at the second endpoint, constructing a replica of the original MIMO signals" | |

The term "at the second endpoint, reconstructing the original MIMO signals" appears in claim 1 of the '504 patent. Claim 1 discusses "frequency shifting n-1 of the MIMO signals" at a first endpoint, propagating the signals to a second endpoint, and then "reconstructing the original MIMO signals."[135]

The parties dispute whether "reconstruction" is limited to returning to frequency-shifted signals back to their original frequencies.

SOLiD's construction most accurately describes "reconstructing the original MIMO signals." Corning argues that the '504 patent's specification "describes" reconstruction "as changing the frequencies of the frequency shifted signals back to their original frequencies." [136] However, the '504 patent never limits reconstructing to shifting frequencies. As such, it is inappropriate to limit the claims to a specific embodiment.[137] SOLiD's proposed construction, in contrast, allows for construction of a "potentially time delayed and amplitude scaled" replica of the

[134] The court agrees with Corning that SOLiD's arguments relating to the prosecution history of a continuation patent are not persuasive. *See* Docket No. 193 at 13.

[135] *Id.* at col.10 ll.8-22.

[136] Docket No. 176 at 24 (citing Docket No. 177-2 at col. 2 ll. 29-32; col. 5 ll. 28-29; col. 6 ll. 7-8)

[137] *See Liebel-Flarsheim*, 358 F.3d at 913; *Prima Tek II*, 318 F.3d at 1148 ("the mere fact that the patent drawings depict a particular embodiment of the patent does not operate to limit the claims to that specific configuration.").

original MIMO signals.[138] Accordingly, the court adopts a slight modified[139] version of SOLiD's construction: "at the second endpoint, constructing a replica of the original MIMO signals."

**SO ORDERED.**

Dated: August19, 2015

PAUL S. GREWAL
United States Magistrate Judge

[138] Docket No. 188 at 25.

[139] The court changed "reconstructing" to "constructing" because the replicas are constructed, not *re*constructed, at the second endpoint.