

Inter Partes Review U.S. Patent No. 9,008,483

Oral Argument, December 16, 2024

Amphenol Corp. v. PPC Broadband, Inc.
Case No. IPR2023-01363

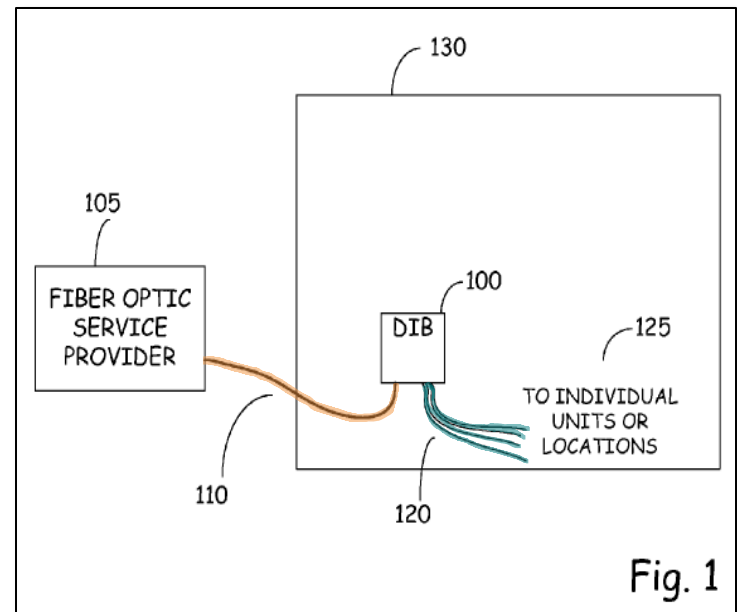
Petitioner's Demonstrative Exhibits – Not Evidence

Petitioner's DX-I

IPR2023-01363
Amphenol EX1034

U.S. Patent No. 9,008,483 - Summary

- ▶ Summary: “[D]rop interface box [DIB] for interfacing between an optical network service provider’s heavy jacketed **drop cable** and optical **distribution cables** at a premises.” ’483 Patent, 2:3-6 (annotated).
- ▶ “DIB 100 mounts at a desired location of a premises 130, which will typically be a multi-dwelling or multi-business type of premises[.]” ’483 Patent, 3:19-22 (annotated).



’483 Patent, Fig.1 (annotated)

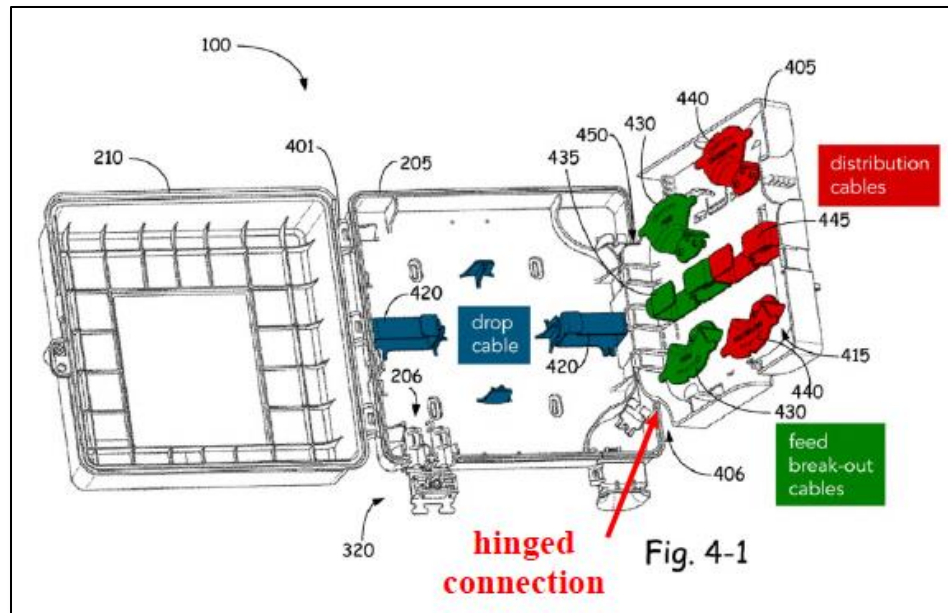
U.S. Patent No. 9,008,483 – Claim I

A drop interface box configured to be mounted to a structure and to receive a drop cable from an optical fiber service provider distribution point and a plurality of distribution cables which distribute the optical fiber service, the drop interface box comprising:

a **base unit** having a drop cable entrance configured to receive the drop cable and having **drop cable retaining mechanisms** spaced apart and **configured to retain a length of drop cable** looped around the drop cable retaining mechanisms;

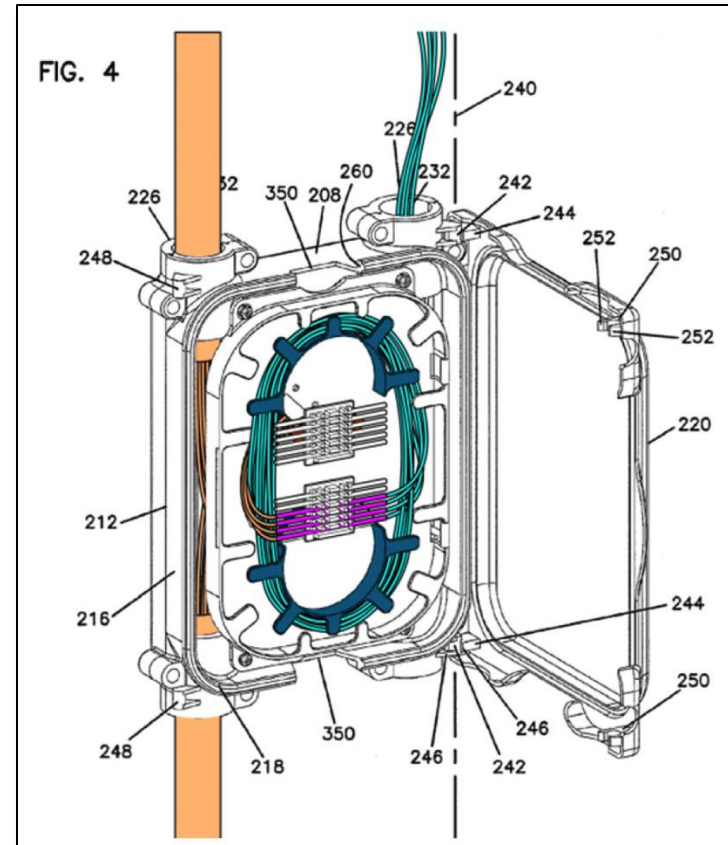
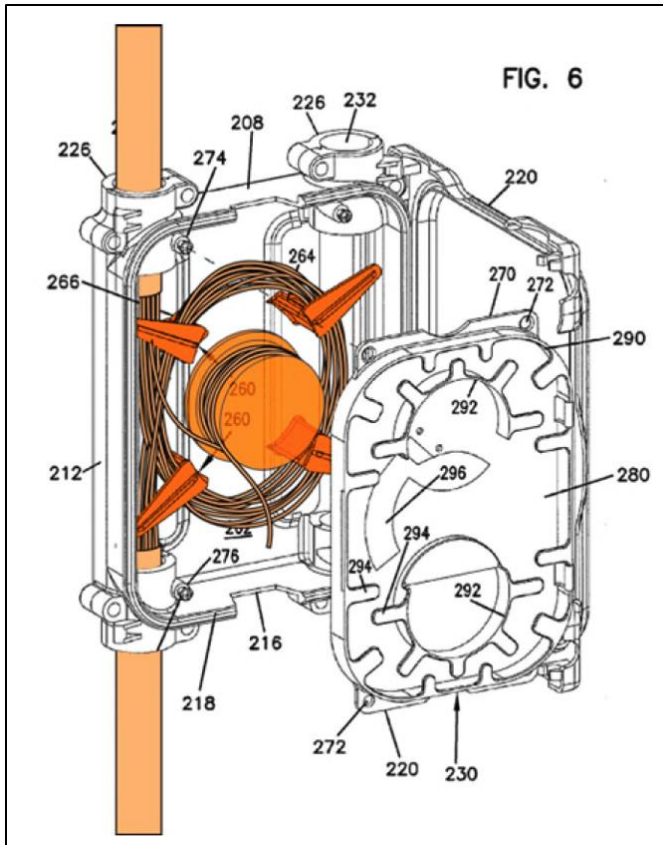
a **cover** having a hinged connection to the base unit to selectively enclose a storage area provided in the base unit; and

a **fiber storage panel** having a hinged connection to the base unit on a side opposite the hinged connection of the cover to the base unit such that the fiber storage panel is moveable relative to the base unit and configured to be stored between the base unit and the cover, the fiber storage panel having **first spools** positioned **to store a plurality of feed break-out cables** coupleable to the drop cable, the fiber storage panel further having **second spools** positioned **to store a plurality of distribution cables** coupleable to the plurality of feed break-out cables.



U.S. Patent No. 9,008,483 - Prosecution

- ▶ Original claims rejected over *Holmberg*. Ex. 1002, 232



U.S. Patent No. 9,008,483 – Prosecution (Cont.)

- ▶ In response, applicant amended to overcome *Holmberg*:

AMENDMENT TO THE CLAIMS

a fiber storage panel having a hinged connection to the base unit on a side opposite the hinged connection of the cover to the base unit such that the fiber storage panel is moveable relative to the base unit and configured to be stored between the base

Id., 247

- ▶ Notice of Allowability:

Regarding claims 1 and 3-14, the prior art as best exemplified by US 2009/0202214 to Holmberg et al., taken individually or in combination, fails to disclose or render obvious a fiber storage panel **having a hinged connection to the base unit on a side opposite the hinged connection of the cover to the base unit** such that the fiber storage panel is moveable relative to the base unit and configured to be stored between the base unit and the cover.

Id., 285



Petitioner's Grounds

Proposed Grounds	Basis	Disputed Claims
Ground 1: Holmberg/Battey	§ 103	1, 11
Ground 2: Holmberg/Battey/Blankenship	§ 103	2, 12, 13
Ground 3: Holmberg/Battey/Blankenship	§ 103	1, 2, 11-13
Ground 4: Holmberg/Battey/Cowen	§ 103	10
Ground 5: Holmberg/Battey/Blankenship/Cowen	§ 103	10

- ▶ Grounds 3 and 5: Apply narrower construction of “drop cable,” requiring jacketed cable routed within DIB
- ▶ ID:

On the present record, we do not understand the recited cable types to be structural limitations. Rather, the recited cable types limit the acceptable retaining mechanisms and spools, with the recited retaining mechanisms

Remaining Disputes

▶ Ground 1: Claim 1

- ▶ Motivation to modify *Holmberg's* splice tray with *Battey's* hinges
 - ▶ *Holmberg's* mid-span box terminates to subscribers, requiring the same easy access as the '483 Patent's DIB
 - ▶ *Holmberg's* box is specifically designed to retain fiber slack, avoiding damage when removing the splice tray

▶ Ground 2: Claim 2

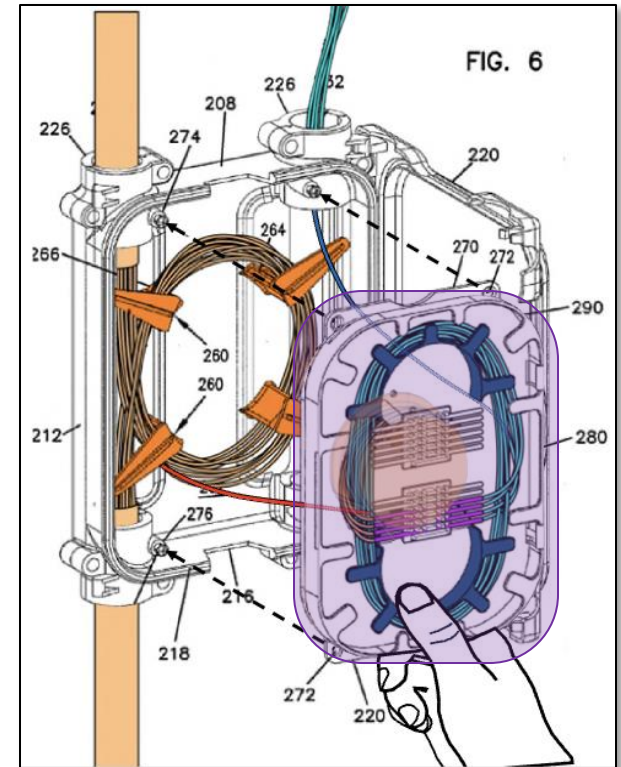
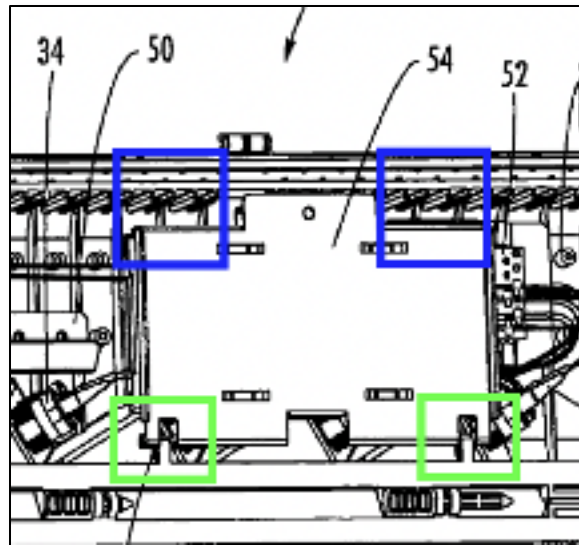
- ▶ Combination **replaces** *Holmberg's* splice holder with *Blankenship's* adapter

▶ Ground 4: Claim 10

- ▶ Motivation to modify *Holmberg's* cable holders with *Cowen's* clips
 - ▶ Combination sacrifices easy installation for fiber security—a tradeoff *Holmberg* accepts elsewhere

Ground I – *Holmberg* in view of *Battey*

- ▶ *Holmberg* discloses all elements except a fiber storage panel (purple) “hinged connection” in limitation I(c).
- ▶ *Battey*’s panel 54 includes splice tray and hinged connection (green) to base unit.
- ▶ *Battey* teaches that its hinges may alternatively be located on the opposite side of its enclosure (blue).



Holmberg, Fig. 6 (annotated)

Battey, Fig. 3 (annotated)

Motivation to Combine *Holmberg* and *Battey*

- ▶ Convenient and easy access to (1) *Holmberg*'s splice tray and (2) components behind the splice tray
 - ▶ *Battey* expressly identifies “providing full and convenient access to the splice tray” as a benefit to using hinged fiber trays. *Battey*, [0039].
- ▶ Dr. Kiaei: “Modifying *Holmberg* to utilize a hinged connection for splice tray 230 instead of threaded fasteners would have been a straightforward application of a known technique that would have improved *Holmberg* in the same way the hinged connections benefited *Battey*.” Ex. 1003, ¶90.
 - ▶ Modification would be a “simple substitution,” using “a known solution” to “advantageously provide easier access to *Holmberg*'s splice tray[.]” *Id.*, ¶92.
 - ▶ POSITA would have expected success at least because hinged connections were well known in the art. *Id.*, ¶93 (pointing to state of the art discussion, including other hinge examples, e.g., *Castonguay*).

PPC's Motivation to Combine Criticisms

- ▶ PPC alleges that *Holmberg's* mid-span enclosure is fundamentally different from the '483 Patent's DIB

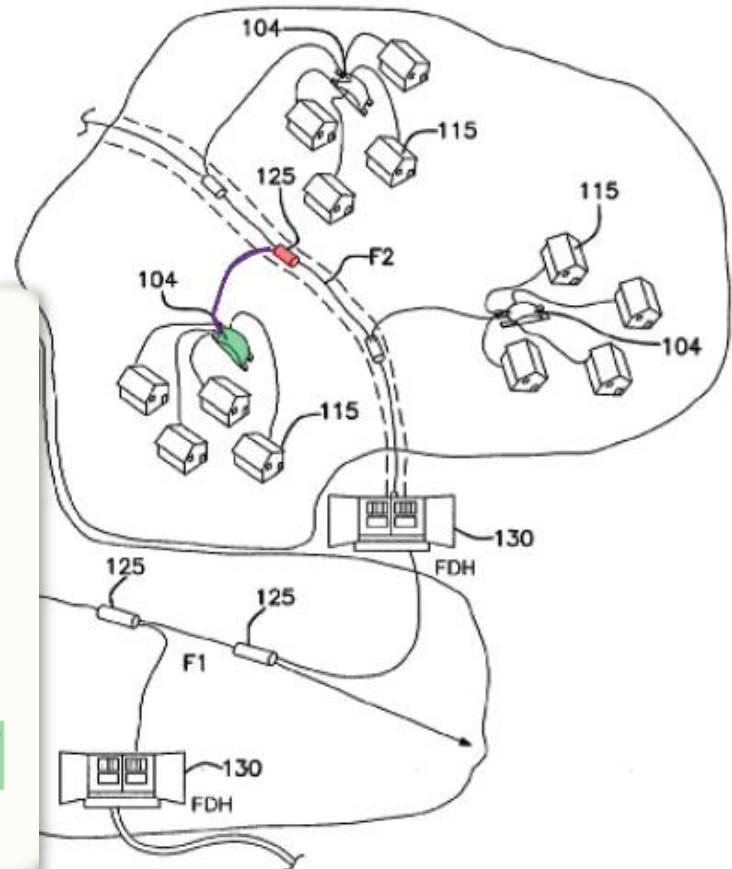
- ▶ 1) PPC argues that *Holmberg's* mid-span enclosure is designed to **prevent** access to rear of splice tray. POR, 19-44.
 - ▶ i) Preventing access logical because mid-span enclosures do not require repeated access to add and remove subscribers.
 - ▶ ii) Pass through fibers are protected by preventing access.

- ▶ 2) PPC argues that *Holmberg's* enclosure would damage fibers if the splice tray rotated open without first removing fibers. POR, 44-63.

Holmberg distinguishes traditional mid-span break-out enclosures from its inventive “wall box”

FIG. 1
(Prior Art)

[0006] Referring to FIG. 1, the network 100 includes a plurality of break-out locations 125 at which branch cables are separated out from main cable lines. Breakout locations can also be referred to as tap locations, drop cable locations, splice locations or branch locations. Branch cables can also be referred to as drop cables, drop lines, breakout cables or stub cables. Branch cables are often connected to drop terminals 104 that include connector interfaces for facilitating coupling the fibers of the branch cables to a plurality of different subscriber locations. Breakout locations are often



Holmberg, Fig. 1 (annotated)

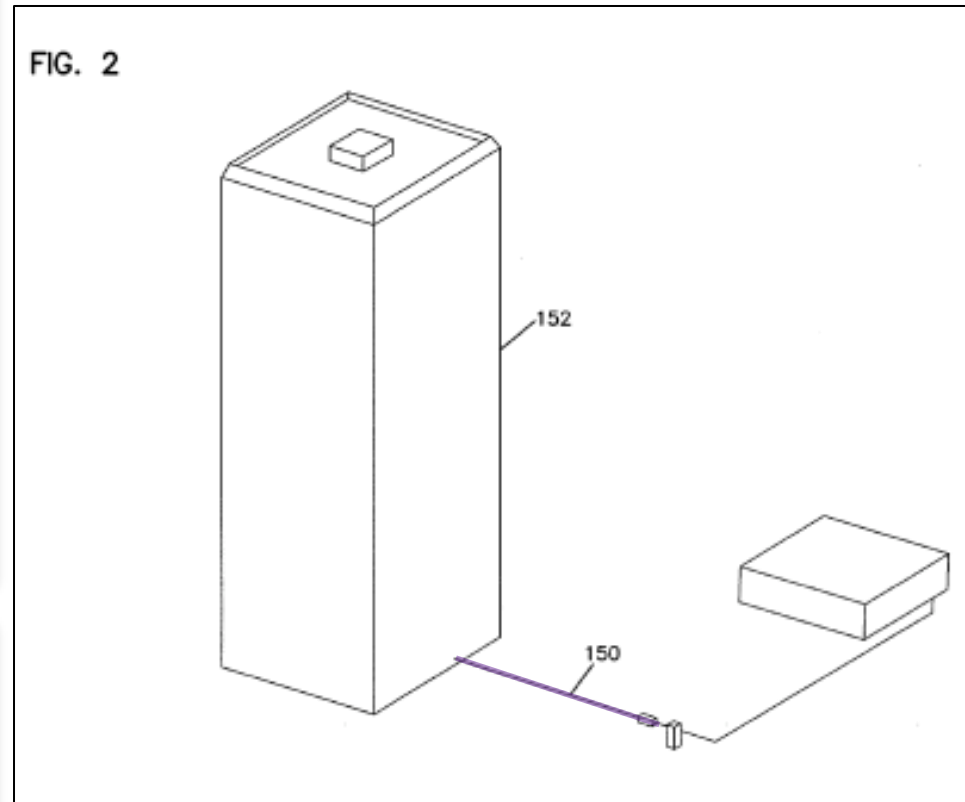
Holmberg distinguishes traditional mid-span break-out enclosures from its inventive “wall box” (cont.)

[0007] Fiber optic networks can extend to multi-dwelling units such as apartment buildings and condominiums. FIG. 2 shows a fiber optic network including a cable 150 routed into a multi-dwelling unit 152. Within the multi-dwelling unit 152, branch cables/fibers are optically coupled to the fibers of the cable 150 at optical coupling locations (e.g., fusion splices, mechanical splices or connectorized optical couplings). The optical coupling locations can be enclosed within one or more wall boxes that are typically equipped with doors/covers that can be opened to provide easy access to the optical coupling locations. The wall boxes are typically provided at different floors of the multi-dwelling unit with each wall box having optical coupling locations corresponding to a plurality of different subscribers (e.g., each resident on a given floor).

SUMMARY

[0008] Certain aspects of the disclosure relate to a wall box for use in a fiber optic network. The wall box can include structure that facilitates mounting the wall box at a mid-span access location of a fiber optic cable.

FIG. 2



Holmberg, Fig. 2 (annotated)

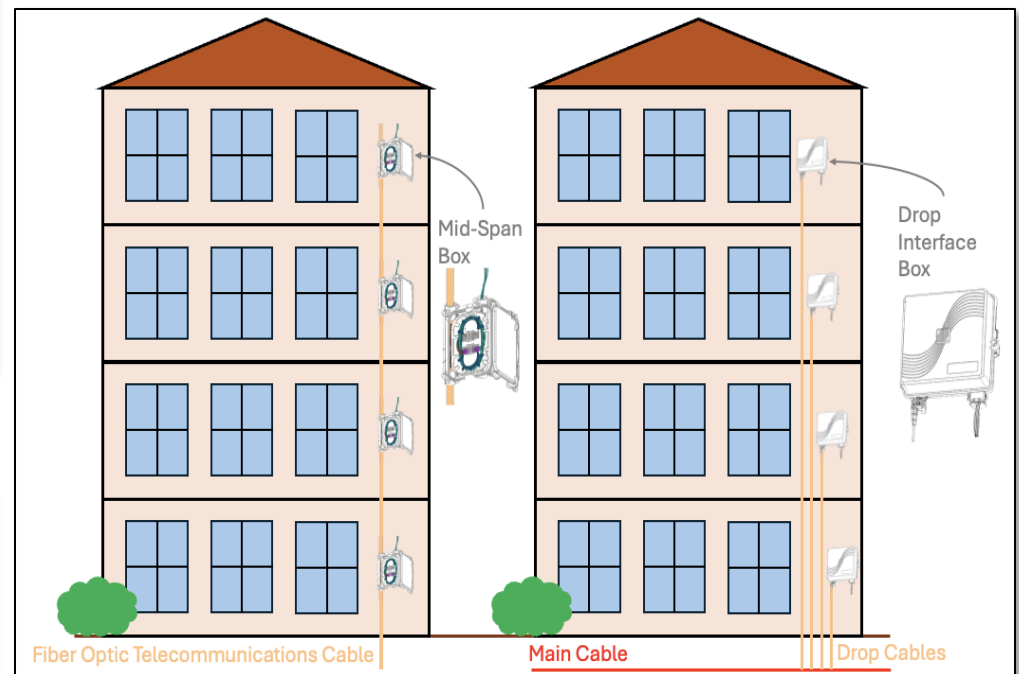
Holmberg's Fiber Delivery Visualized

[0034] The present disclosure relates generally to wall boxes configured to be easily mounted at mid-span locations along the length of a fiber optic telecommunications cable. It is preferred for wall boxes in accordance with the principles of the present disclosure to be used for indoor applications such as multi-dwelling units, or commercial buildings where a plurality of subscribers is located. However, it will be appreciated that wall boxes in accordance with the principles of the present disclosure can be used for either indoor or outdoor applications wherever it is desired to easily mount an enclosure at a mid-span location of a telecommunications cable.

Holmberg, [0034] (annotated)

[0007] The optical coupling locations can be enclosed within one or more wall boxes that are typically equipped with doors/covers that can be opened to provide easy access to the optical coupling locations. The wall boxes are typically provided at different floors of the multi-dwelling unit with each wall box having optical coupling locations corresponding to a plurality of different subscribers (e.g., each resident on a given floor).

Holmberg, [0007] (annotated)



Reply, 10

PPC's expert admitted boxes that terminate fiber to customers require easy access to add/remove subscribers

PPC's Expert's Admission & Confusion

4 Q. (By Mr. Hart) It's true that the multiunit
5 dwellings served by Holmberg would require an ability
6 to connect and disconnect new subscribers as needed,
7 isn't it?
8 MR. SULLIVAN: Objection to form.
9 A. Yes. And that ability is typically
10 provided by the drop terminal that Holmberg describes
11 or a drop interface box such as the '483.

Ex. 1023, 49:4-11 (annotated)

23 Q. Am I understanding your opinion correctly
24 that the relevant distinction between these two types
25 of boxes is that you believe there is an intermediate
1 device between Holmberg's wall box and the end
2 subscriber, and there is no intermediate device
3 between the '483 DIB and an end subscriber?
4 ...
5 A. That is correct. ...
6 ...
8 the Holmberg device is intended as a mid-span
9 device that can route signals through fibers to a
10 building, but with the intention of there being
11 another interface unit to bring the signals to the
12 ultimate user location, apartment, actual apartment
13 unit or other -- other location.

Ex. 1023, 42:23-43:13 (excerpted; annotated)

Only Amphenol's expert properly interprets *Holmberg*

A POSITA would have understood that *Holmberg's* invention is directed to wall boxes designed to terminate fiber directly to end subscribers at a multi-dwelling unit:

The present disclosure relates generally to *wall boxes configured to be easily mounted at mid-span locations* along the length of a fiber optic telecommunications cable. It is preferred for wall boxes in accordance with the principles of the present disclosure to be used *for indoor applications such as multi-dwelling units*, or commercial buildings *where a plurality of subscribers is located*.

Holmberg, [0034] (emphases added).

Secured/removed via normal screws, *Holmberg's* splice tray is intended to be accessed after initial installation

PPC's expert admits screws are simply unscrewed:

25 Q. It's true that Holmberg's splice tray can
1 be removed by unscrewing fasteners 276, isn't it?
2 A. By unscrewing all four fasteners 276,
3 that's correct. That's accurate.

Ex. 1023, 69:25-70:3

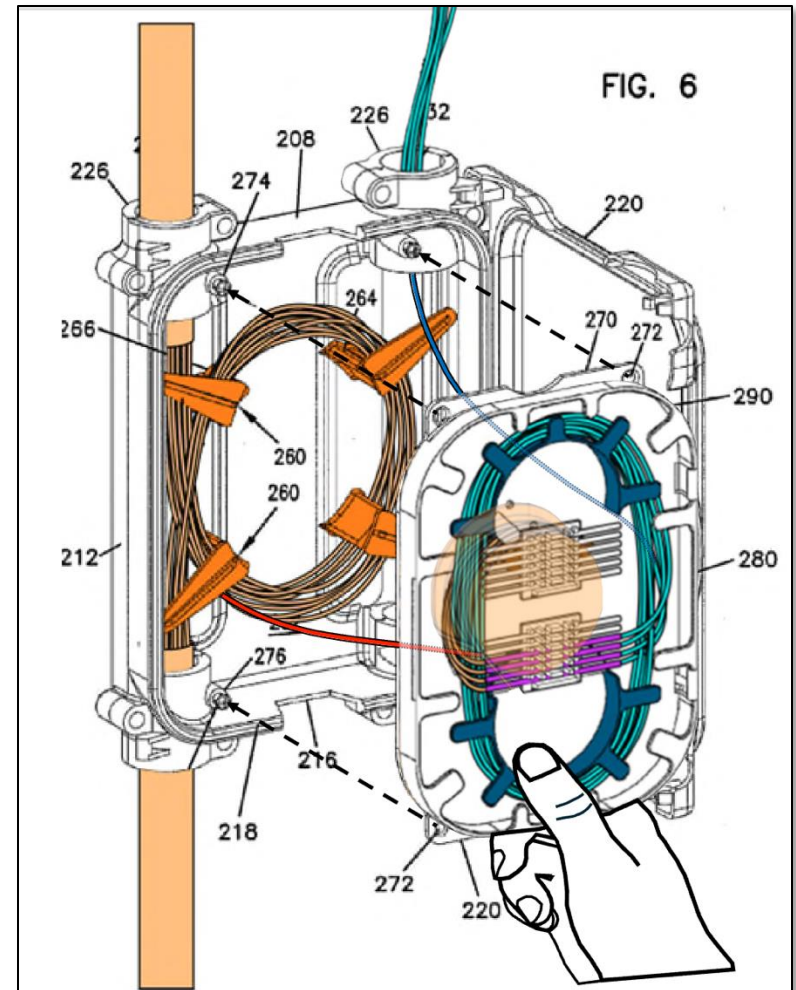
PPC's expert even proposes screws 276 can temporarily hold splice tray 230 in place during installation:

10 fibers are prearranged, the technician might -- I
11 mean, might envision putting one or two of the screws
12 in presumably to hold the splice tray in place while
13 everything was completed, acknowledging that if there
14 was a change in the plan, the splice tray might be
15 removed to finalize everything.

Ex. 1023, 61:10-15

Reinforcing motivation to combine, PPC's expert acknowledges *Holmberg's* shortcomings

- ▶ **PPC's expert admitted that *Holmberg* provides no mechanisms to hold splice tray during operation—technician holds tray with one hand and installs with other hand.**
 - ▶ Ex. 1023, 53:4-24.
- ▶ **Difficult/impossible to splice with one hand.**
 - ▶ Ex. 1023, 60:22-25.
 - ▶ Ex. 1033, ¶39 (confirming technicians generally require two hands for splicing).
- ▶ **PPC's expert's proposed solutions:**
 - ▶ (1) Hanging the splice tray by its stored fibers.
 - ▶ Ex. 2023, 54:3-9, 61:2-8.
 - ▶ (2) One or two screws temporarily holding splice tray.
 - ▶ Ex. 2023, 61:9-15.
- ▶ **Amphenol expert:**
 - ▶ *Battey's* hinge connection is a better solution than (1) risking damage by hanging from fibers or (2) inconveniently installing and removing two screws. Ex. 1022, ¶¶40-41.



Holmberg, Fig. 6 (annotated)

All fiber enclosures—including DIBs—risk downstream damage

- ▶ PPC's expert admitted caution was needed for any fiber enclosure.
- ▶ PPC's expert disagreed with Petitioner that service interruptions are a risk only for enclosures with pass through fibers.
- ▶ Training technicians, not restricting access, is the preferred means of avoiding damage when working in enclosures.

23 Am I correct that one distinction according
24 to your declaration between mid-span boxes and NIDs is
25 that mid-span boxes pass through some number of
1 fibers, and technicians working on mid-span boxes must
2 be cognizant of downstream service interruptions while
3 working on those boxes? Is that right?

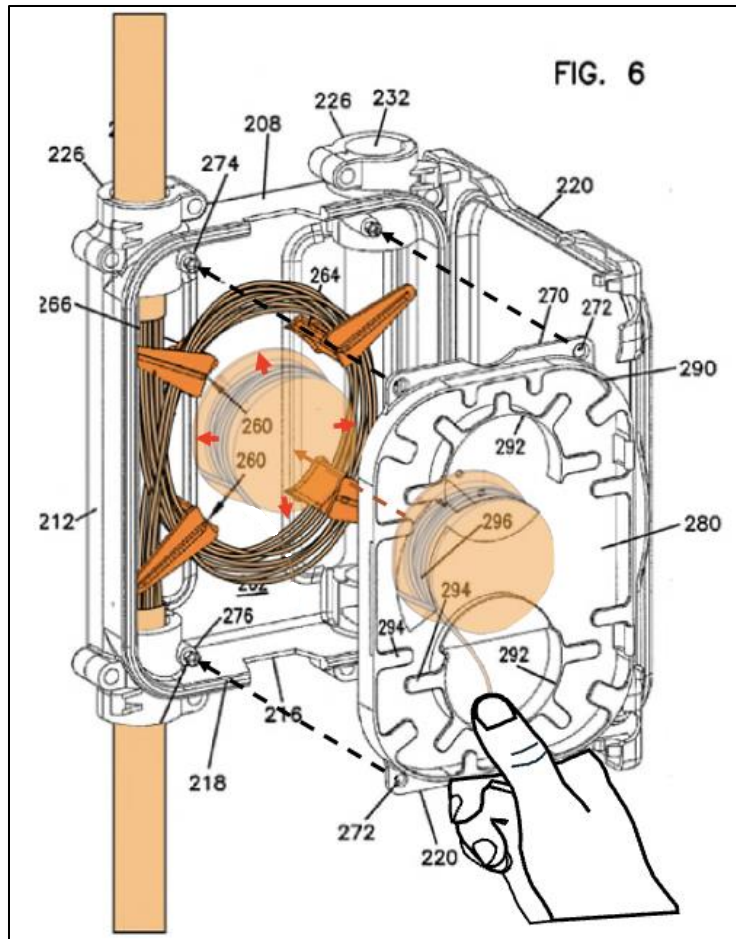
4 A. That's an accurate statement, yes. That's
5 an accurate statement.

6 Q. And that concern does not exist with NIDs
7 because no fibers pass through NIDs according to you;
8 correct?

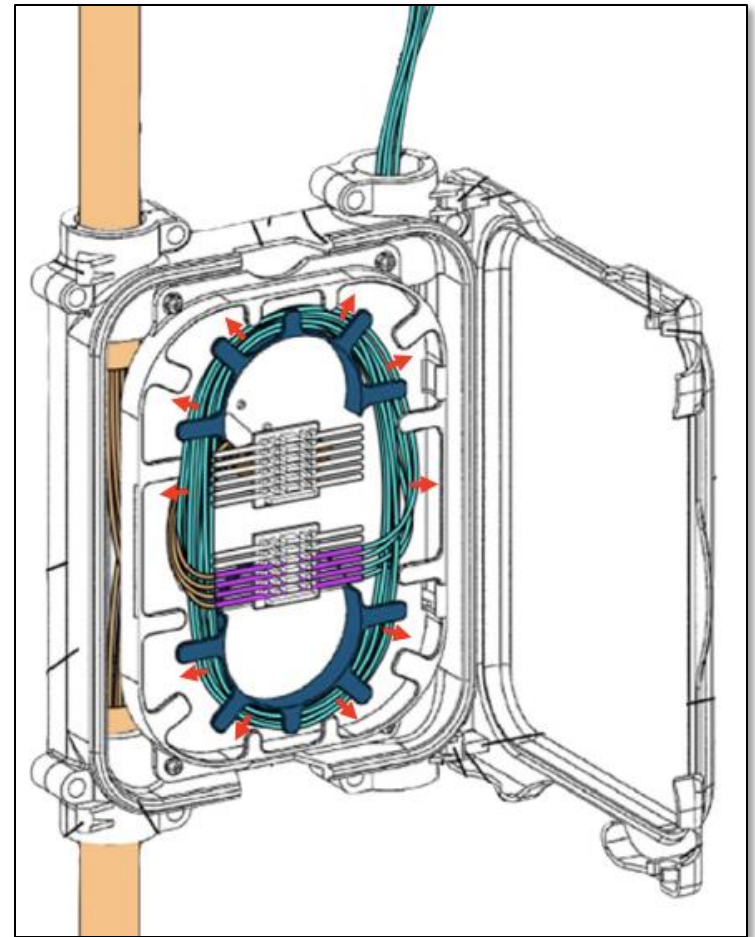
9 A. I wouldn't -- I will answer that. I don't
10 completely agree with the way you characterized it.
11 My statement is not to suggest that a person,
12 technician operating on a NID can operate on that unit
13 willy-nilly and without regard to impacting the entire
14 network.

(Ex. 1023) Eldering Depo.Trans., 34:23-35:14 (annotated)

Holmberg's wall box accommodates fiber slack



Holmberg, Fig. 6 (annotated)



Holmberg, Fig. 6 (annotated)

Ground 2: Claim 2

Blankenship's adapter replaces Holmberg's splice sleeve holder

- A. **Claim 2:** The drop interface box of claim 1, wherein the fiber storage panel further includes an adapter bracket configured to hold one or more adapters which couple the plurality of feed break-out cables to the plurality of distribution cables.

Holmberg in view of *Battey* teaches the claimed “fiber storage panel.” See Ground 1, Claim 1(d). *Holmberg-Battey* teaches Claim 1. See Ground 1, Claim 1. *Holmberg* teaches coupling a plurality of feed break-out cables to a plurality of distribution cables. *Id.* *Holmberg* does not expressly teach an adapter bracket

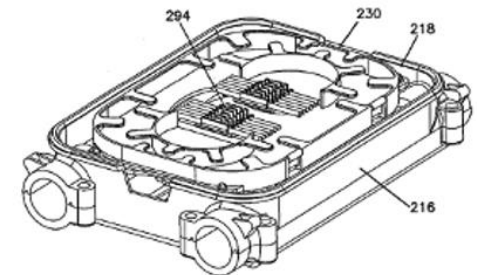
Ground 1, Claim 1(d):

Holmberg teaches terminated fiber is fed through openings 296 from the rear side of splice tray 230 to the front side of splice tray 230 and is spliced to a distribution cable with the “splice being mounted at the splice sleeve holder 294[.]”

...

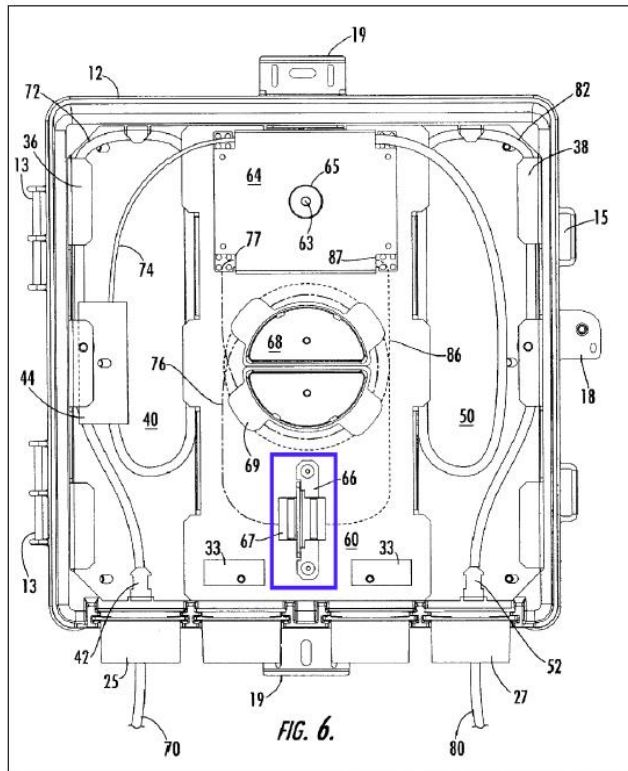
Holmberg's Fig. 12 below depicts splice sleeve holder 294.

FIG. 12



Ground 2: Claim 2 (cont.)

Blankenship's adapter replaces Holmberg's splice sleeve holder



Blankenship, Fig. 6 (annotated), see also Figs. 2-4.

A POSITA would have been motivated and found it obvious to modify *Holmberg-Battey* to utilize an adapter bracket holding one or more brackets to couple a plurality of feed break-out cables to a plurality of distribution cables for

Indeed, such a use of a known technique of using an adapter bracket and adapters to connect a plurality of feed break-out cables and a plurality of distribution cables would have advantageously improved *Holmberg-Battey* in the same way as *Blankenship, Dec.*, ¶¶116-119. A POSITA would have been motivated and found it obvious to make such a modification to take advantage of well-known adapter brackets and adapters to provide simplified and robust optical connections between the fibers of a plurality of feed break-out cables and a plurality of distribution cables. *Dec.*, ¶¶116-119.

Pet., 66.

With respect to claim 2, Petitioner concedes that *Holmberg* does not disclose an adapter bracket configured to hold one or more adapters which couple the feed break-out cables to the distribution cables, but asserts that *Blankenship* discloses this feature. *Id.* at 62–63. Petitioner contends one of ordinary skill in the art would have sought to utilize such an adapter bracket in *Holmberg/Battey* in order “to provide simplified and robust optical connections” between the fibers of the feed break-out cables and distribution cables in *Holmberg*. *Id.* at 65–66.

ID, 6.

PPC's arguments are red herrings

Holmberg's splice sleeve holder is replaced in combination

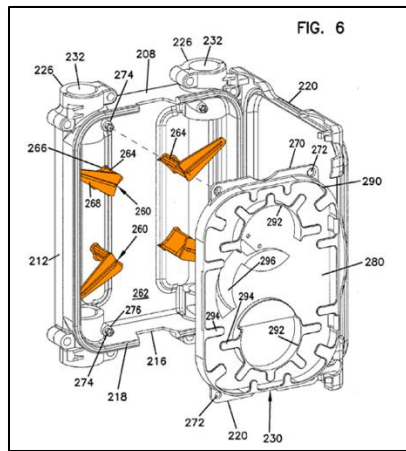
- ▶ PPC's attempt to reframe proposed combination based on *Holmberg's* alternative embodiments or bodily incorporation of *Blankenship* must be rejected.
- ▶ Proposed combination **replaces** splicing with adapter

The *Blankenship* adapters in the Petition's mapping and the adapters in *Holmberg's* other embodiments serve entirely separate purposes. Indeed, a POSITA would have understood that the *Holmberg* combination would have benefited from *Blankenship's* adapter bracket 66 regardless of other, separate adapters on the outer cover of the wall box. *Blankenship's* adapter bracket would have been utilized to replace *Holmberg's* splicing (replacing splice sleeve holder 294) such that splicing would not have been necessary on splice tray 230. The adapters in *Holmberg's* other embodiments (e.g., in Figs. 16-18) attach to the outside of the enclosure, connecting external connectorized fibers to the internal fibers. In these embodiments, the connections secured on splice tray 230 are still required, and *Holmberg* is clear that splice tray 230 remains a critical component of these alternative embodiments. *Eldering Depo. Tr.*, 75:18-79:5; *Holmberg*, [0056], Figs. 16-18.

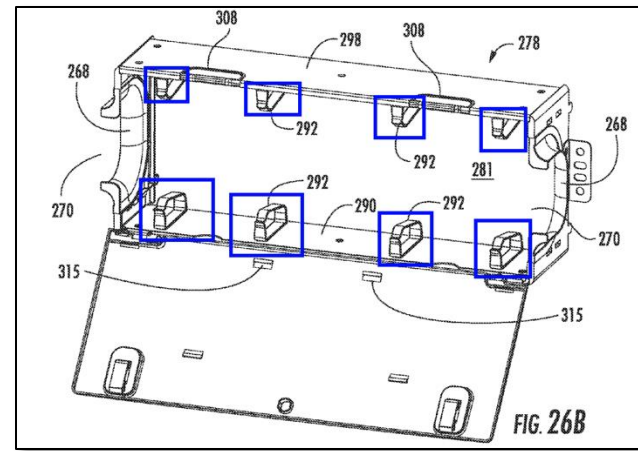
Ex. 1033, ¶49

Ground 4, Claim 10: Tradeoffs

- ▶ Cowen's storage clips 292 [blue] improve cable management, cable routing, and fiber security, especially during installation, over Holmberg's cable retention members 268 [orange].



Holmberg, Fig. 6 (annotated)



Cowen, Fig. 26B (annotated)

- ▶ Proposed combination exchanges ease of installation for fiber security.

Ground 4, Claim 10: Tradeoffs (cont.)

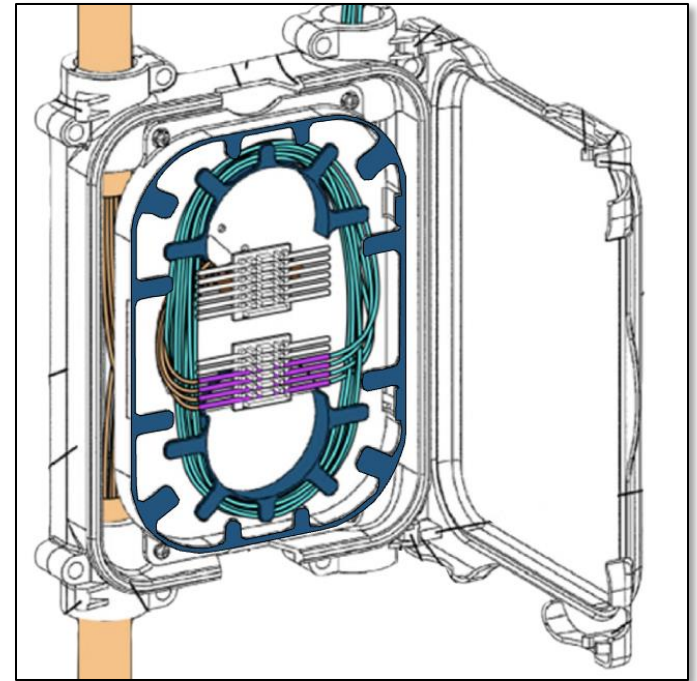
- ▶ Implicated tradeoff would have been appreciated by POSITA
 - ▶ *Holmberg* makes the same tradeoff, accepting more difficult fiber routing for increased security.
- ▶ PPC's Expert agrees that the alternating retention fingers (annotated navy) complicate installation.

21 Q. I see. Okay.
22 Is it more difficult to route the output
23 fibers around this depicted retaining mechanism with
24 the addition of the inward facing fingers than it
25 would be if only the outwardly facing fingers existed?

1 MR. SULLIVAN: Objection to form.

2 A. Well, it's certainly going to take a tad
3 more dexterity on the part of the technician,

Ex. 1023, 74:21-75:3 (annotated)



Holmberg, Fig. 6 (annotated)