Application Note
DENALI™ Outback Clip Capacity and Trunk Cable Routing

This Application Note will discuss the pre-installed cable mounting clips or "outback" clips, that are included on the DENALI trunk cable assemblies, the capacity of these clips within the various DENALI Housings and the recommended routing of trunk cables with each clip.

Outback Clip

The outback clip (OBC), integrated onto DENALI trunk cable assemblies, mounts directly on the DENALI Housing in the rear trunk cable management area **(Figure 1)**. This standard clip eliminates the need for additional cable clamps and securely positions the incoming cable onto the Housing. The cable assembly rotates freely within the outback clip eliminating the stress associated with standard fixed mounting brackets **(Figure 2)**. The outback clip snaps onto the bridge lance forms and can be removed by pulling out on the lever and rocking the clip out from the lance forms. For installations where multiple cables need to be attached to one T-lance (up to four) a hook and loop option is available.

There is one standard outback clip size (small). The small outback clip holds up to 288 fibers and 13 mm cable OD. Standard Trunk Cable Assemblies are available in fiber counts of 8, 12, 24, 48, 72, 96, 144 and 288.

The hook and loop OBC is available in two sizes, small and large **(Figure 3)**.

The small can handle up to a 13 mm cable OD. The larger is capable of up to 23 mm cable OD.

Figure 1—Outback Clip

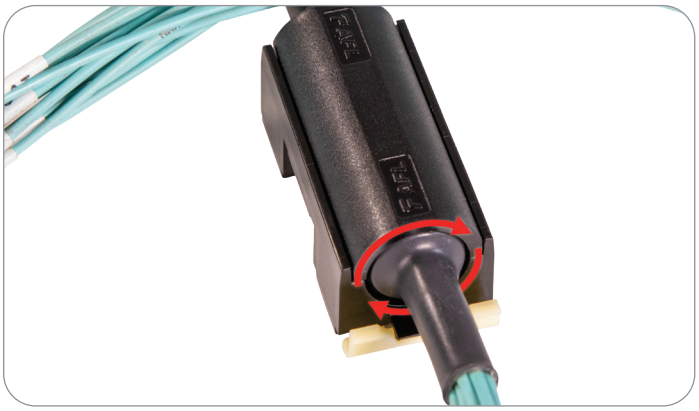

Figure 2—Cable can rotate in Outback Clip

Figure 3—Small and Large OBC

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Fiber Housings and Cassettes

DENALI fiber Housings are available in 1RU, 2RU and 4RU sizes. Each Housing size has a set number of lance positions to accommodate outback clips.

The 1RU Housing has four lance positions total and two per side **(Figure 4)**, the 2RU Housing has eight lance positions total and four per side **(Figure 5)** and the 4RU Housing has 12 lance positions total and six per side **(Figure 6)**.

Figure 4—Lance Positions in 1RU Housing

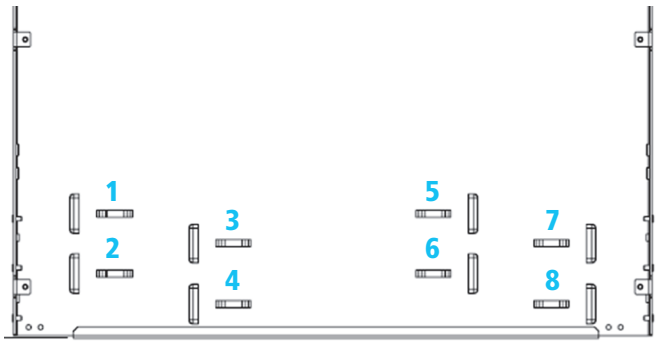

Figure 5—Lance Positions in 2RU Housing

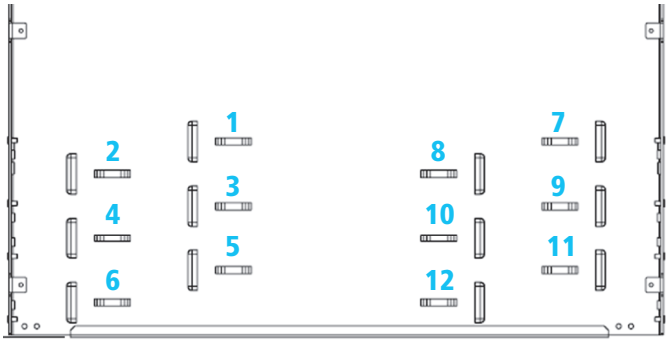

Figure 6—Lance Positions in 4RU Housing

Each RU has a capacity of three trays and each tray accommodates 6, 4 or 2 cassettes for Base-8, Base-12 or Base-24, respectively. The tray and cassette capacity of each RU is outlined in the table below **(Figure 7)**.

Figure 7—Tray and Cassette Capacity

HOUSING/RU	TRAY CAPACITY	BASE CONFIGURATION	CASSETTES PER TRAY	TOTAL CASSETTES
1RU	3	BASE-8	6	18
		BASE-12	4	12
		BASE-24	2	6
2RU	6	BASE-8	6	36
		BASE-12	4	24
		BASE-24	2	12
4RU	12	BASE-8	6	72
		BASE-12	4	48
		BASE-24	2	24

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Depending on the type of cassette, each RU can hold a maximum amount of fiber. For simplicity, this Application Note will focus on MPO patch cassettes and MPO-LC fanout cassettes. Each patch cassette will accept 32 or 72 fibers for Base-8 and Base-12, respectively. Fanout cassettes accept 8, 12 or 24 fibers for Base-8, Base-12 and Base-24, respectively. The fiber capacity of each Housing size (RU) is outlined in the table below **(Figure 8)**.

Figure 8—Fiber Capacity

BASE	CASSETTES TYPE	1RU	2RU	4RU
BASE-8	MPO Patch	576	1152	2304
	Fanout	144	288	576
BASE-12	MPO Patch	864	1728	3456
	Fanout	144	288	576
BASE-24	Fanout	144	288	576

Outback Clip Capacity

Taking into consideration the maximum number of lance positions in each Housing size, the total cassette capacity in each RU and the total fiber count allowed in each cassette, there are several combinations of outback clips and trunk cables that can fit into each Housing size (RU).

***NOTE:** To ensure maximum efficiency of fiber routing into trays and cassettes, AFL's recommendation is to route and install trunk cables into a single side of the Housing only. See "Single Side Trunk Cable Configuration" on page 5.

1RU Panel

The maximum fiber capacity in a 1RU Housing with Base-12 fanout cassettes is 144 fibers. The standard outback clip can hold 144 fibers so only one (1) 144 fiber trunk cable is required to fill this Housing. Alternatively, as there are four (4) total lance positions (two per side), the Housing could accept any OBC combination of two (2) 72 fiber trunk cables or three 48 fiber trunk cables.

The maximum fiber capacity in a 1RU Housing with Base-12 MPO patch cassettes is 864 fibers. To reach this fiber count, three (3) 288 fiber trunk cables are required. Alternatively, two (2) 288 fiber trunk and two (2) 144 fiber trunk cables can also be utilized to reach the maximum fiber count. Configurations are outlined in the table below **(Figure 9)**.

Figure 9—1RU Trunk Cable Capacity

1RU TRUNK CABLE CAPACITY BY FIBER COUNT						
CASSETTE TYPE	TOTAL FIBERS	288	144	96	72	48
BASE-12 Fanout	144	N/A	1	N/A	2	3
BASE-12 MPO Patch	864	3	N/A	N/A	N/A	N/A
BASE-8 Fanout	144	N/A	1	N/A	2	3
BASE-8 MPO Patch	576	2	4	N/A	N/A	N/A

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2RU Panel

The maximum fiber capacity in a 2RU Housing with Base-12 fanout cassettes is 288 fibers. To reach this fiber count it requires either two (2) 144 fiber trunk cables or one 288 fiber trunk cable. Alternatively, as there are eight (8) total lance positions (four per side), this Housing could accept four (4) 72 fiber trunk cables or as many as six 48 fiber trunk cables.*

The maximum fiber capacity in a 2RU Housing with Base-12 MPO patch cassettes is 1728 fibers. To reach this fiber count six (6) 288 fiber trunk cables are required. Alternatively, four (4) 288 fiber trunk cables and four (4) 144 fiber trunk cables can also be utilized to reach the maximum fiber count. Configurations are outlined in the table below **(Figure 10)**.

Figure 10—2RU Trunk Cable Capacity

2RU TRUNK CABLE CAPACITY BY FIBER COUNT						
CASSETTE TYPE	TOTAL FIBERS	288	144	96	72	48
BASE-12 Fanout	288	1	2	3	4	6
BASE-12 MPO Patch	1728	6	N/A	N/A	N/A	N/A
BASE-8 Fanout	288	1	2	3	4	6
BASE-8 MPO Patch	1152	4	8	N/A	N/A	N/A

4RU Panel

The maximum fiber capacity in a 4RU Housing with Base-12 fanout cassettes is 576 fibers. To reach this fiber count, it requires either two (2) 288 fiber trunk cables or four (4) 144 fiber trunk cables. Alternatively, as there are 12 lance positions, the panel could accept as many as twelve (12) 48 fiber standard OBC trunk cables.

The maximum fiber capacity in a 4RU Housing with Base-12 MPO patch cassettes is 3,456 fibers. To reach this fiber count twelve (12) 288 fiber trunk cables are needed. Alternatively, an external mounting bracket can be used for additional cable. Configurations are outlined in the table below **(Figure 11)**.

Figure 11—4RU Trunk Cable Capacity

4RU TRUNK CABLE CAPACITY BY FIBER COUNT						
CASSETTE TYPE	TOTAL FIBERS	288	144	96	72	48
BASE-12 Fanout	576	2	4	6	8	12
BASE-12 MPO Patch	3456	12	N/A	N/A	N/A	N/A
BASE-8 Fanout	576	2	4	6	8	12
BASE-8 MPO Patch	2304	8	N/A	N/A	N/A	N/A

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Single Side Trunk Cable Configuration

While the use of cable entries and lance positions on both sides at the rear of Housings is feasible, AFL recommends single side trunk cable configuration as the best practice for maximizing fiber counts and cable routing efficiencies in this high-density modular platform. This approach will reduce the number of lance positions available to accommodate trunk cables with outback clips and will require consideration for higher fiber count trunk cable selection. There are two sets of lance forms in each panel – one for each side entrance. If there is a requirement to enter the rear of the panel from one side, the available lance positions to use for outback clips are cut in half (**Figure 12** below).

Figure 12—Lance Positions

HOUSINGS/RU	ENTERING FROM BOTH SIDES	ENTERING FROM SINGLE SIDE
1RU	4	2
2RU	8	4
4RU	24	12

NOTE: If more fiber is needed to come into the Housing from one side, there is an external bracket that can mount to the side of the Housing. 1RU and 2RU Housings can accommodate one mounting bracket per side, with options for either top or bottom cable entry (**Figure 13**) and 4RU Housings are able to accommodate two mounting brackets per side, with options for either top or bottom cable entry (**Figure 14**).

Figure 13—2RU with 1 mounting bracket for top cable entry

Figure 14—4RU with 2 mounting brackets for top cable entry

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Routing

It is recommended when using multiple standard trunk cables to begin installation at the T-lance forms closest to the trays and progress toward the rear of the housing. After rocking/locking the outback clip into place on the appropriate lance form, route the fiber in an S-shape manner to make the connections into the cassettes starting on the bottom row and progressing upward **(Figure 15)**.

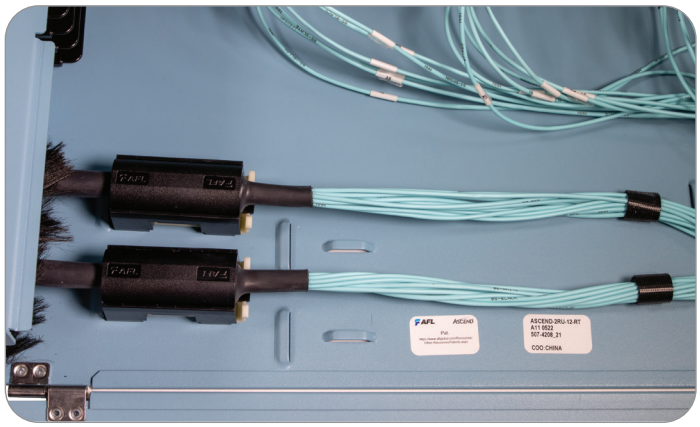

Figure 15—S-shape routing

Incoming Cable: Two Sides

If the cable is entering the DENALI Housing from both sides, it is recommended to begin installation at the T-lance forms closest to the trays and alternate sides while progressing toward the rear of the Housing. Trunk cable routing for 1RU, 2RU and 4RU DENALI Housings utilizing both sides for cable entry are outlined in the images below (**Figures 16, 17 and 18**, respectively).

Figure 16—1RU routing recommendation for cable entry from both sides

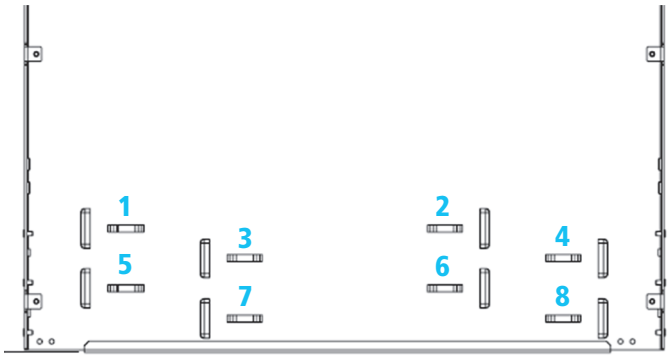

Figure 17—2RU routing recommendation for cable entry from both sides

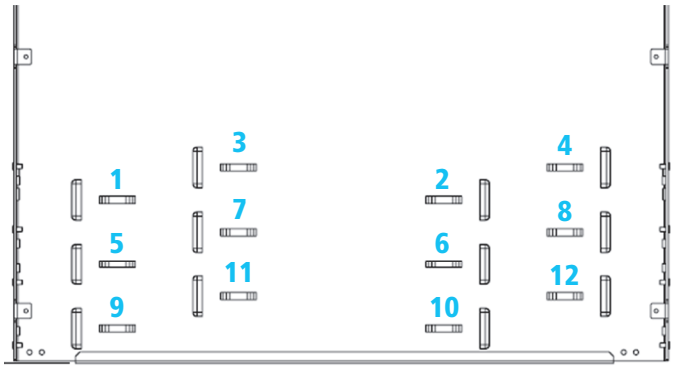

Figure 18—4RU bottom routing recommendation for cable entry from both sides

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Incoming Cable: One Side

If the cable is entering the DENALI Housing from the right or the left side, it is recommended to begin installation at the T-lance form closest to the trays and progress toward the rear of the Housing. Trunk cable routing for 1RU, 2RU and 4RU DENALI Housings utilizing one side only for cable entry are outlined in the images below (**Figures 19, 20 and 21**, respectively).

Figure 19—1RU routing recommendation for cable entry from one side

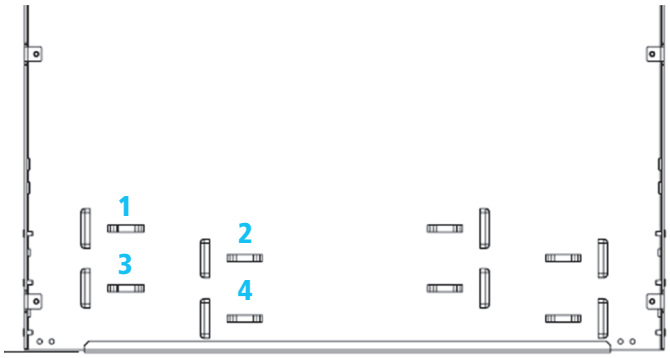

Figure 20—2RU routing recommendation for cable entry from one side

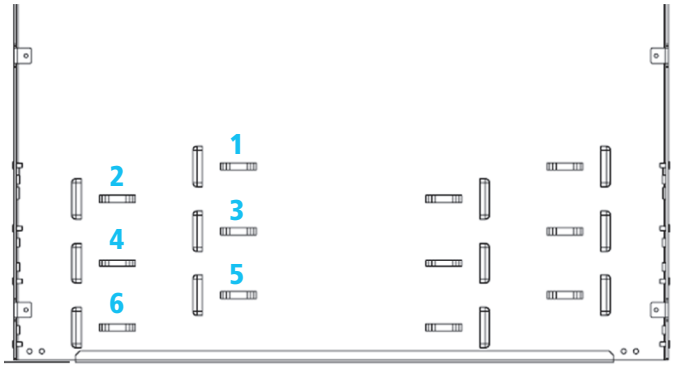

Figure 21—4RU bottom routing recommendation for cable entry from one side