

# **LOGISTICS AND DIRECTIONS**

## **EVLA Correlator Room**

### **Station Rack-to-Baseline Rack High-Speed Cable**

#### **Installation Plan**

LAD Document: **A25005N0001**

Revision: 1.01

B. Carlson, June 24, 2008

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B. Carlson, June 24, 2008

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## 1 Revision History

<b>Revision</b>	<b>Date</b>	<b>Changes/Notes</b>	<b>Author</b>
DRAFT	July 18, 2006	Initial release for review.	B. Carlson
DRAFT2	Oct. 19, 2007	Changes to reflect new connectivity scheme. DRAFT2 release for review.	B. Carlson
DRAFT3	Oct. 25, 2007	Add instructions for plugging cables into CB (Common Backplane) headers after racks are installed.	B. Carlson
DRAFT4	Nov. 14, 2007	Correct Station Board to BB/IF associations to be consistent with V2.0 of A25010N0002.	B. Carlson
1.0	May 27, 2008	Add all Baseline rack cable installation drawings. Pre-install release.	B. Carlson
1.01	June 24, 2008	Fix error on page 60; cable labels 35 and 36 swapped.	B. Carlson

## 2 Introduction

This manual contains instructions for the installation of the hi-speed cable from Station Racks to Baseline Racks.

There are 2 phases of installation:

- **Section 4.1** contains instructions for installation of cables under the floor, BEFORE racks are installed.
- **Section 4.2** contains instructions for plugging cables into pin headers for both S racks and B racks AFTER racks are installed.

Cable in this manual carries high-speed data and control signals from X-bar Boards located in Station Racks to Baseline Boards located in Baseline Racks.

There are 128 “**cable sets**” to be installed. Each cable set is labeled with a unique number in the range 1 to 128.

Each cable set is bundled with an overall sheath and contains 4 “**quad-wafer**” cables.

Each quad-wafer cable consists of 16, differential pairs, each pair carrying data at 1.024 Gbps.

Cable and cable ends are delicate and so caution must be exercised during installation not to damage cables or cable ends.

This cable is installed on the screened room floor, under the raised floor tiles.

Cables are installed prior to correlator rack delivery.

Please read and familiarize yourself with all of these instructions and fully understand what is to be done before proceeding with any cable installation. Failure to follow the instructions could result in cable damage and unnecessary work.

### 3 Overview

There are 8 Station Racks (“S” racks) and 8 Baseline Racks (“B” racks) in the system. The layout of the racks in the correlator room is shown below<sup>1</sup>:

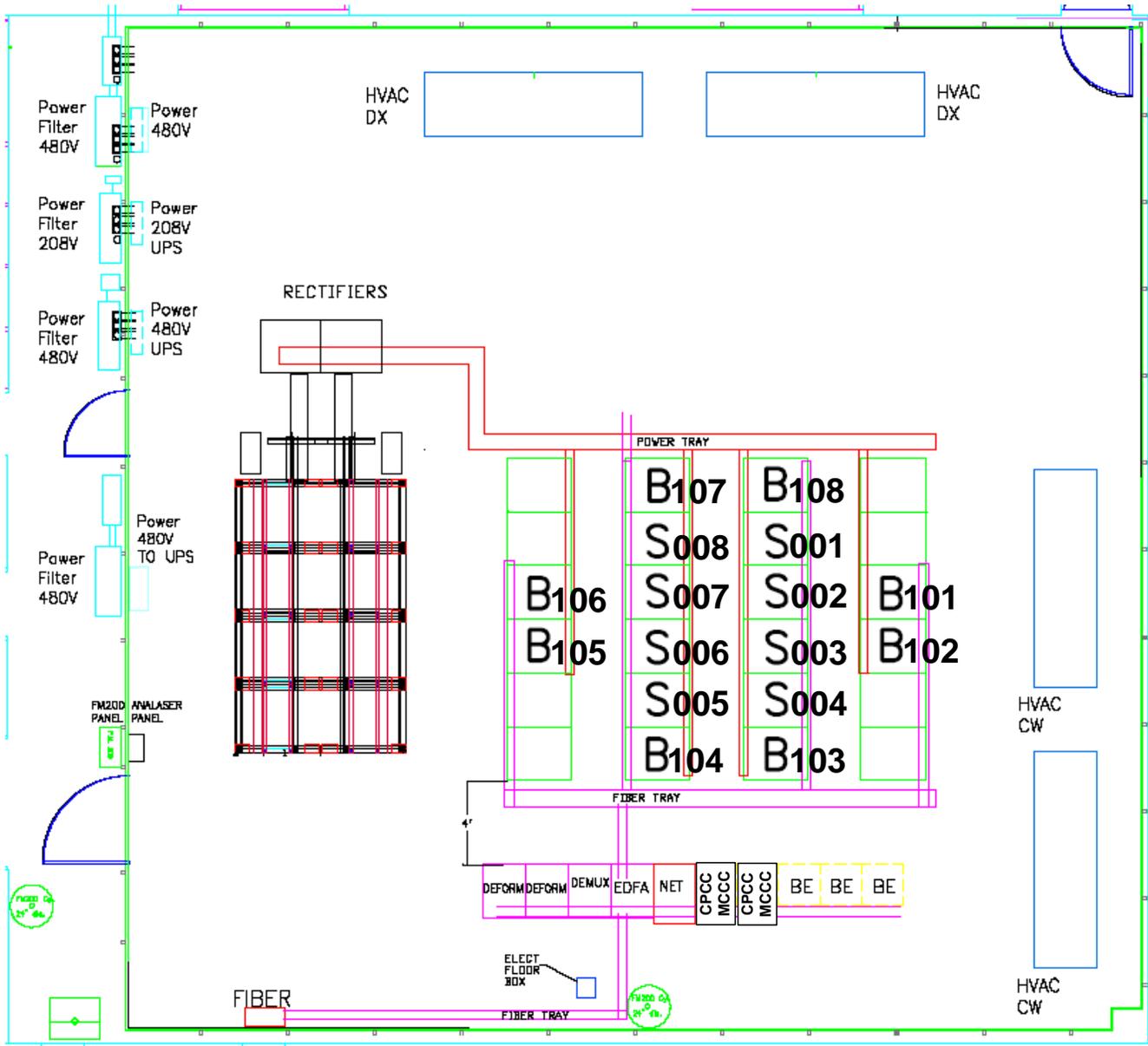


Figure 3-1 Rack numbering and orientation in the correlator room.

<sup>1</sup> Taken from drawing provided by Guy Stanzione, and modified to show rack numbering.

**3.1 BACKGROUND INFORMATION: Rack Numbering and Logical Station-to-Rack Associations**

**S racks** are numbered 001 to 008.

**B racks** are numbered 101 to 108.

The correlator contains 32 logical “stations”: **1-32**

The mapping of a correlator “station” to an EVLA antenna is established by fiber routing connections outside the scope of the correlator and this plan.

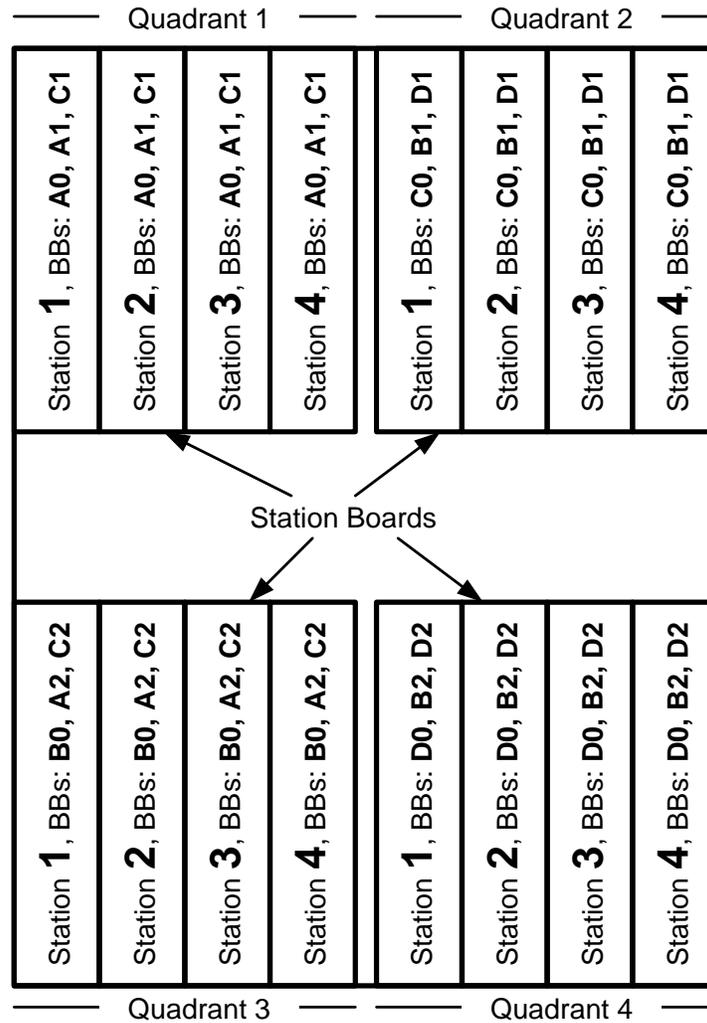
Knowledge of antenna-to-station mapping is not important or required for this cable installation, however, “stations” are located in racks in a logical fashion according to the following table:

<b>Station Numbers</b>	<b>S rack</b>
1-4	S001
5-8	S002
9-12	S003
13-16	S004
17-20	S005
21-24	S006
25-28	S007
29-32	S008

Each S rack contains/processes all of the bandwidth for 4 EVLA antennas.

Within an S rack, BB and IF allocations to individual Station Boards are according to the following diagram (shown for S001, other S racks follow a similar logical assignment):

**View into FRONT of S rack S001**



Fiber into Station Boards must be routed according to this diagram.

“Quadrants” are correlator quadrants associated with the BBs indicated, for IFs **A**, **B**, **C**, and **D**.

### 3.2 Cable Kits, Labelling, and Nomenclature

Cables are provided as a set of 8 kits, each kit contains 16 cable sets.

Each cable set is labeled with a unique global number in the range 1-128.

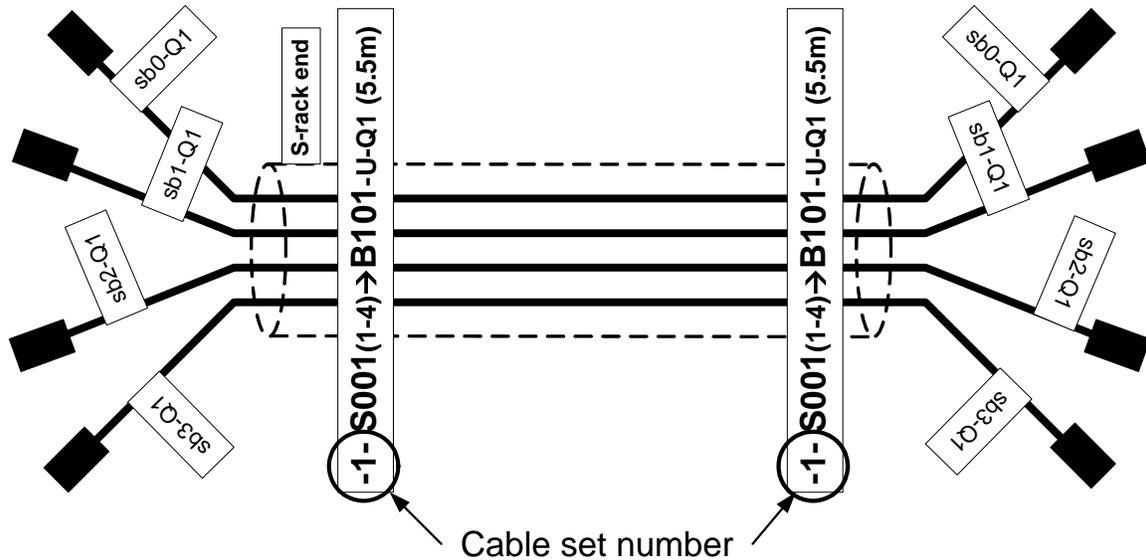
There is one kit for each S rack. Each kit is labeled with the S rack it is for, and the cable set numbers contained within the kit.

Example kit label:

## **Cable Kit S002; cable sets 17-32**

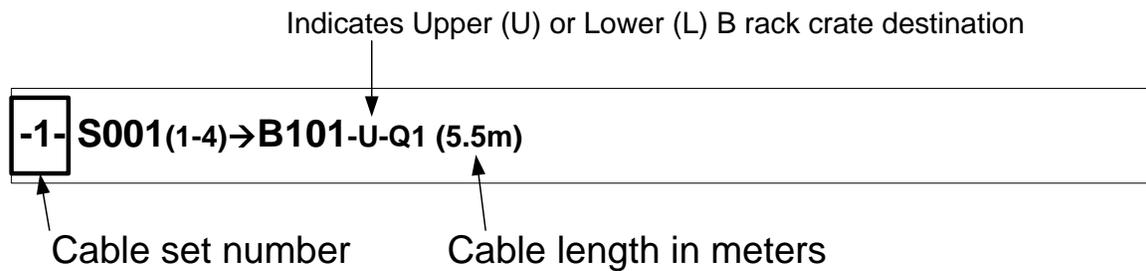
Each cable set consists of 4 cables; cables are bundled into cable sets for convenience of installation since cables within a cable set have the same approximate endpoints.

Each cable set within each kit is labeled according to the following example:



**For this installation it is not important to know cable labeling nomenclature details.**

All that it needed is the cable set number, clearly identified on the largest label of the cable set, knowing which end is the S rack end, and knowing which B rack crate, Upper or Lower the cable set terminates at:



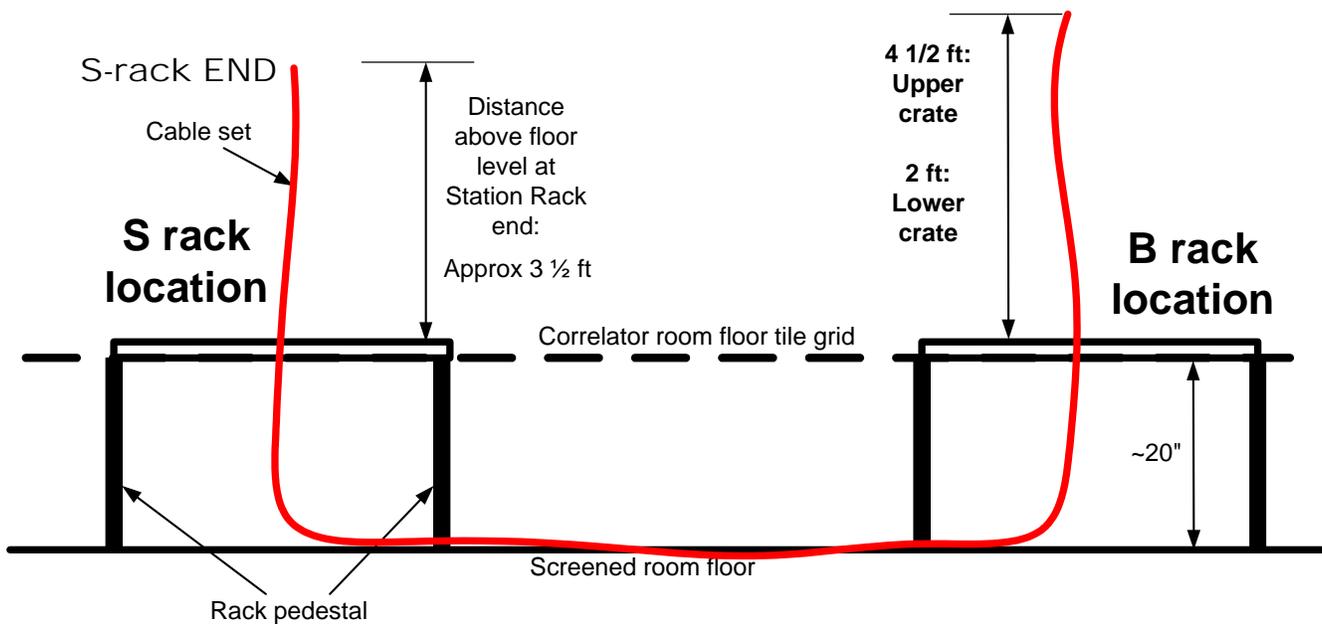
**IMPORTANT!** cable sets are installed so the end labeled “S-rack end” is at the **S** rack location, and the other end is at the **B** rack location.

**3.3 Physical Routing Notes**

Cable sets and instructions are specified for the rack layout shown in Figure 3-1. Rack (2.5ft x 3ft) hole locations should be temporarily labeled with the rack number labels as in the figure to facilitate installation.

Cable set lengths are long enough for “Manhattan” routing in the vertical plane, and for “as the crow flies” (shortest distance) in the horizontal plane.

About 3 ½ ft of cable length must be left above the room floor at the Station Rack end, and 2 ft or 4 ½ ft at the Baseline Rack end depending on whether the cable set is destined for the Lower (L) crate or Upper (U) crate respectively. This is shown in the following figure.



**Figure 3-2 Cable routing in the vertical plane.**

Cables are installed before racks are installed.

**EXCEPTION!** Any 2 m length cable sets are NOT INSTALLED until racks are installed, as they don't route under the floor.

We recommend fabricating and installing temporary posts, in the center of the hole for each rack, onto which cable ends can be attached and temporarily secured as each cable is installed.

When all cables are installed there will be a large criss-cross of cables in the horizontal plane with no regular cable runs.

Cables crossing each other may need crossing supports to avoid cable crush. Further evaluation after installation is required to determine if additional cable-crossing supports need to be installed.

Care must be exercised in the installation of the cables, since the cable and ends are relatively delicate and can be damaged if they are stepped on.

The ends of the cables should remain covered in protective foam and must not be subjected to any crushing or pulling forces.

**CAREFUL! Don't step on the cables or cable ends**

## 4 Installation Instructions

### 4.1 PRE-RACK INSTALLATION: Cable Installation

The following pages contain cable routing diagrams for the installation

**BEFORE** racks are installed.

**For each kit, there are 2 pages, containing 16 cable sets.**

In total, 128 cable sets are to be installed.

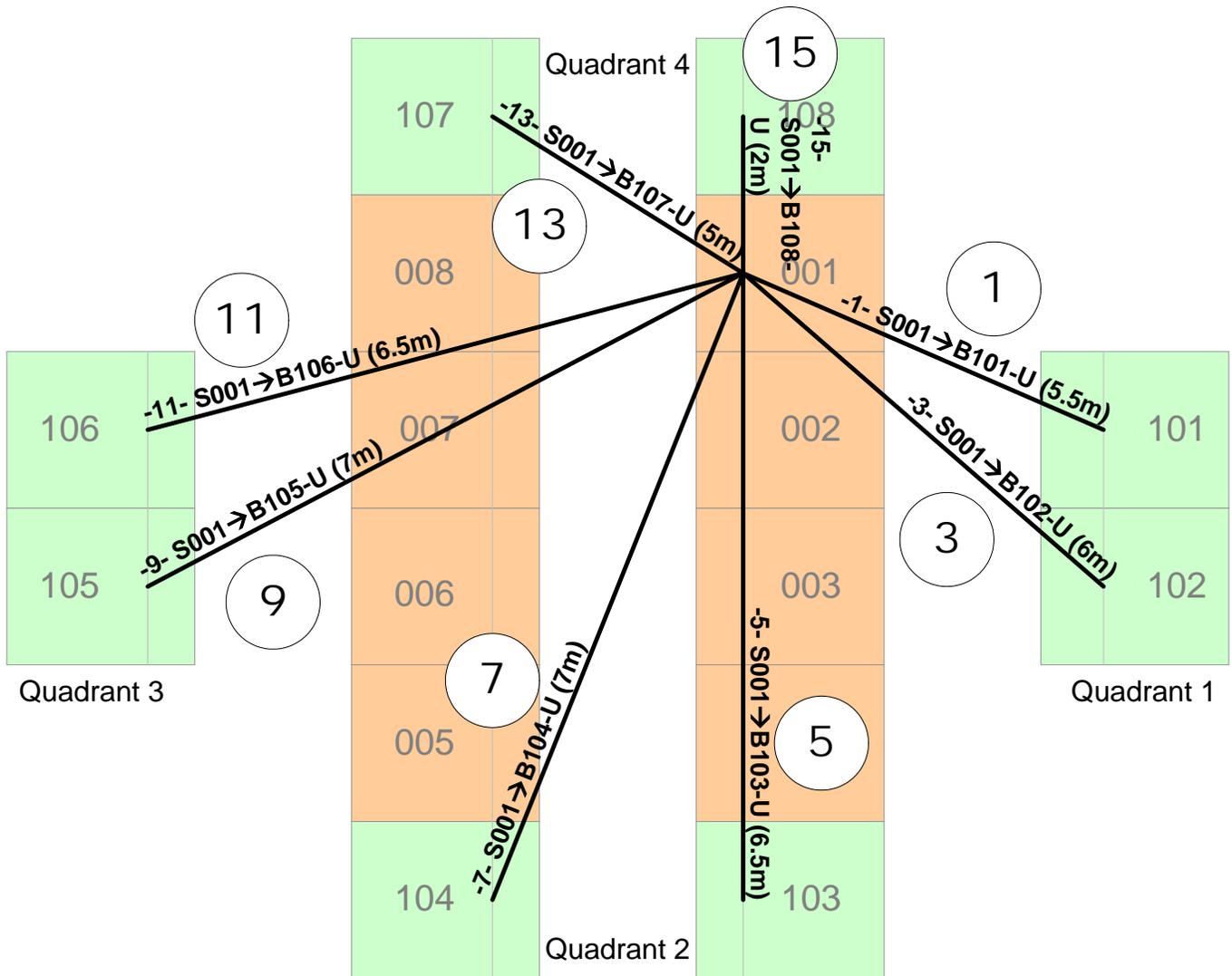
**EXCEPTION!** Any 2 m length cable sets are NOT INSTALLED until racks are installed, as they don't route under the floor.

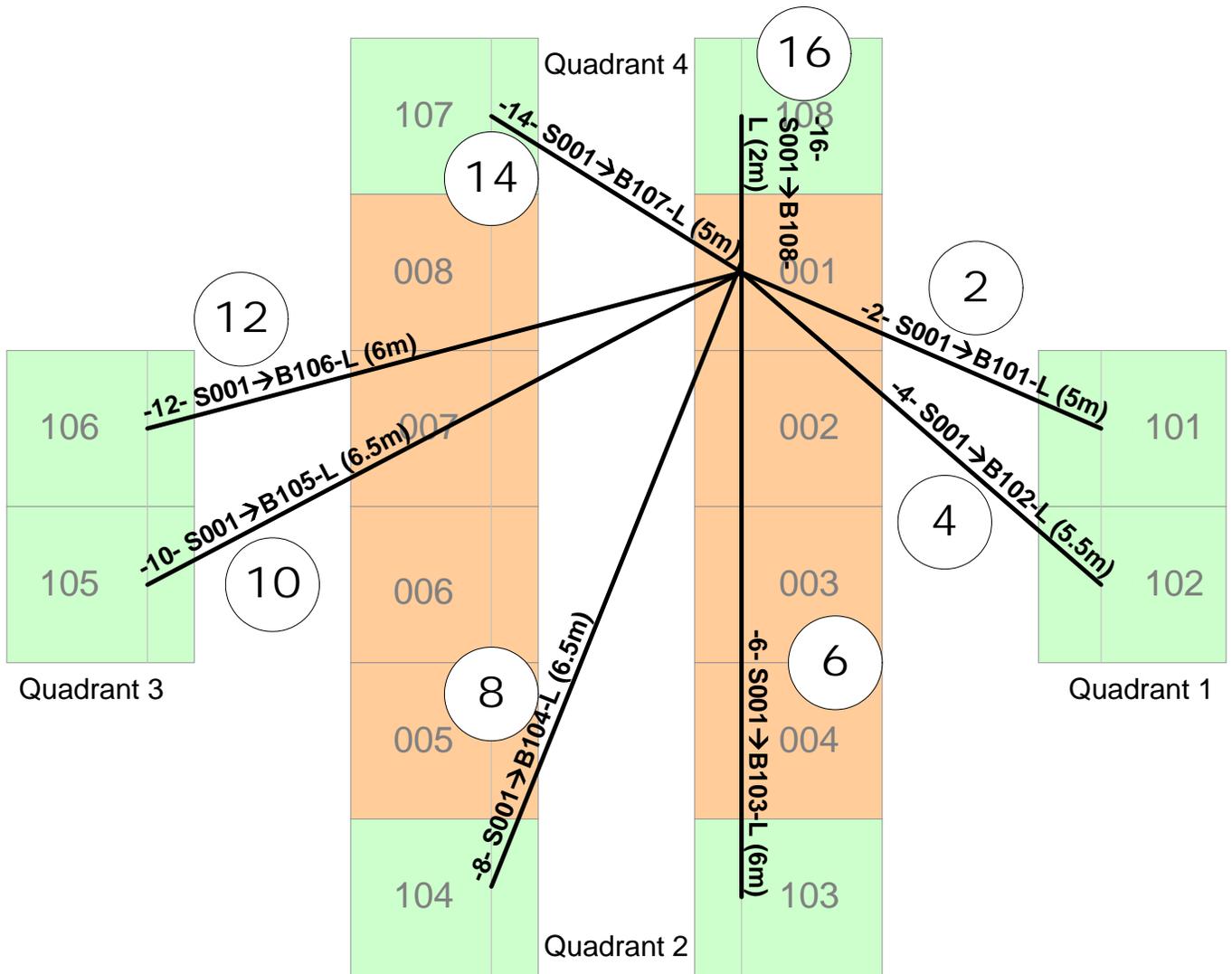
Each cable set has a unique number, and these numbers are clearly indicated on each diagram and on the cable set label.

As each cable set is installed from each kit, check-off the corresponding cable set number in the kit diagram.

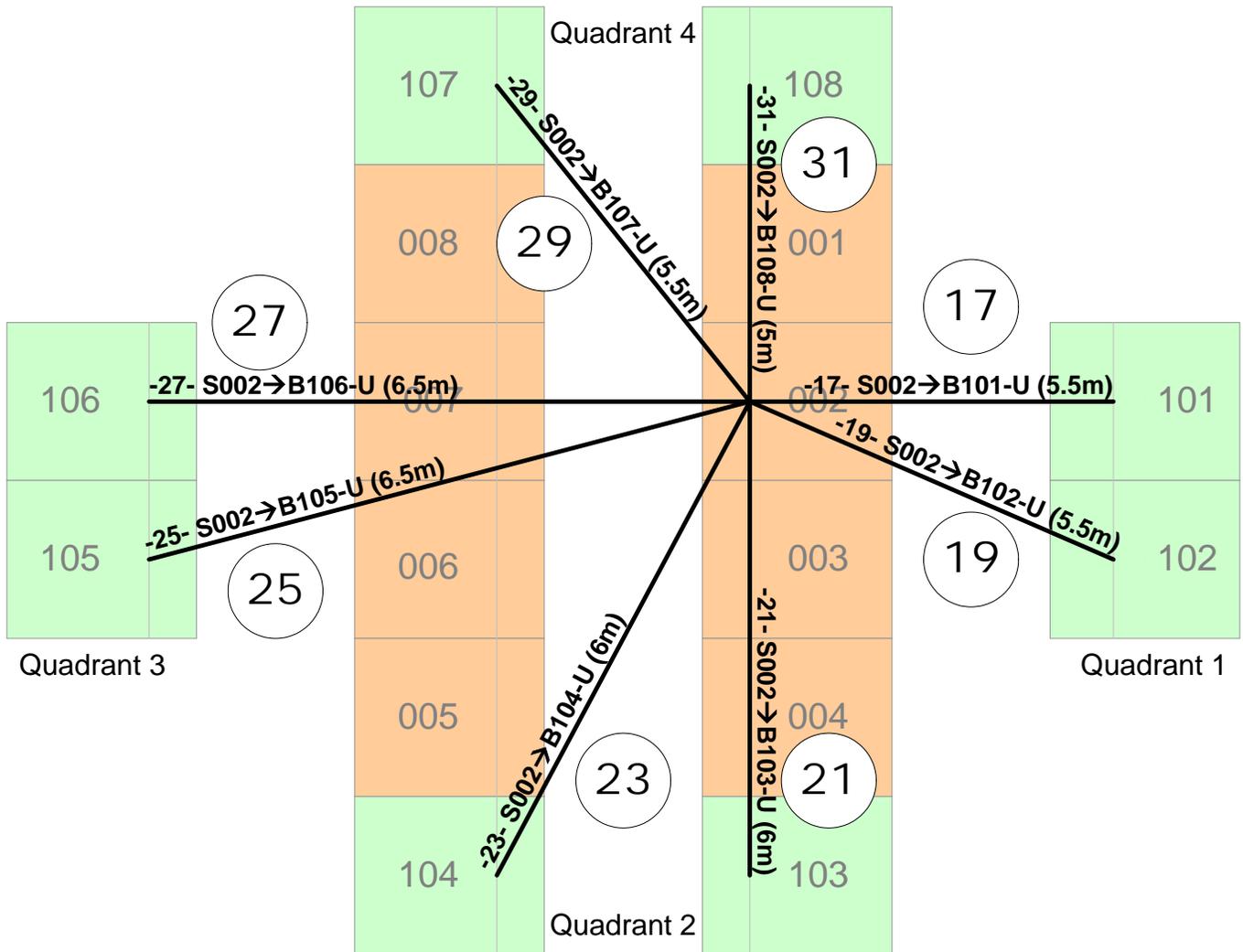
✓ Once all cables are installed, check to ensure that the correct cables come out of the correct rack holes.

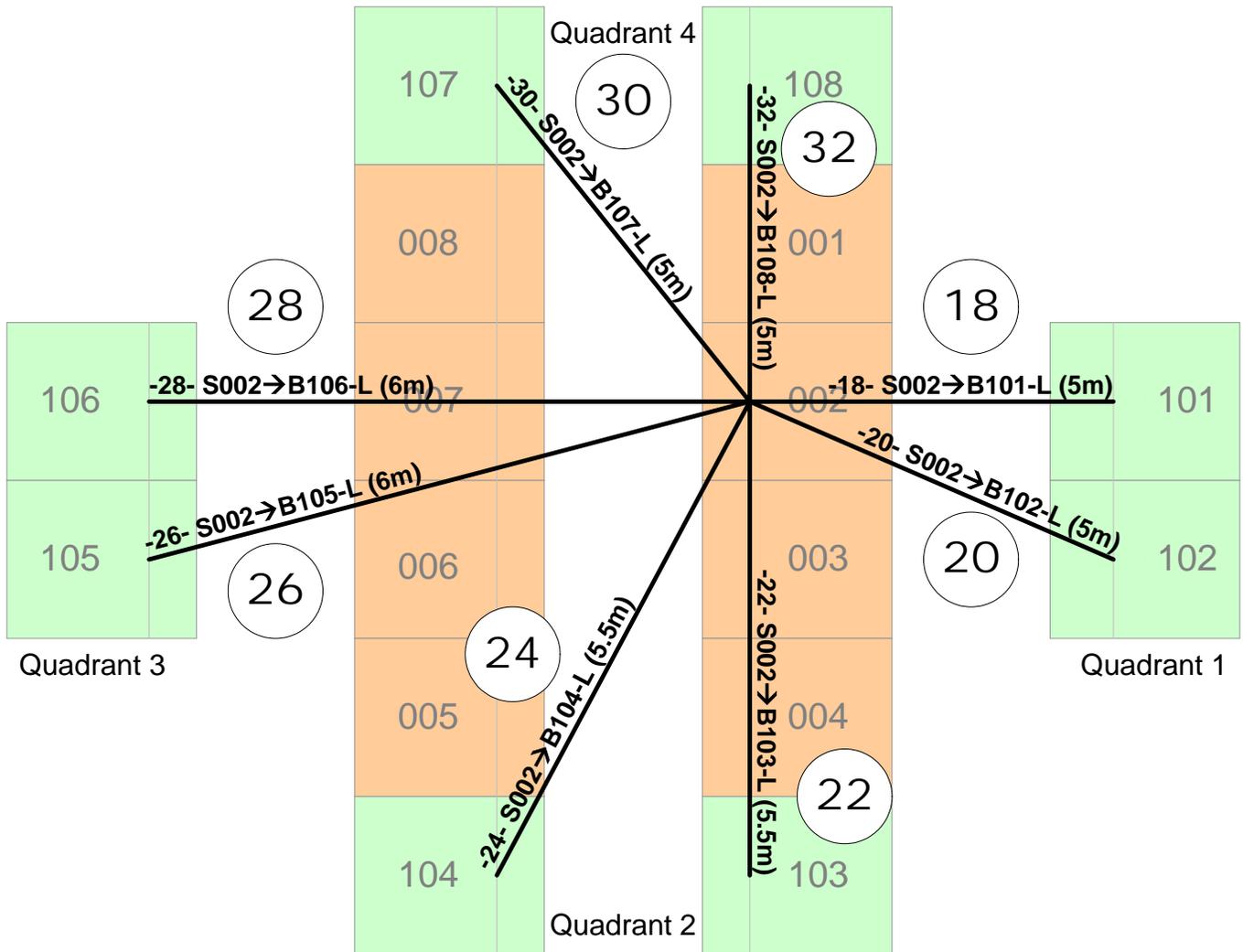
# **Kit S001, cable sets 1-16**



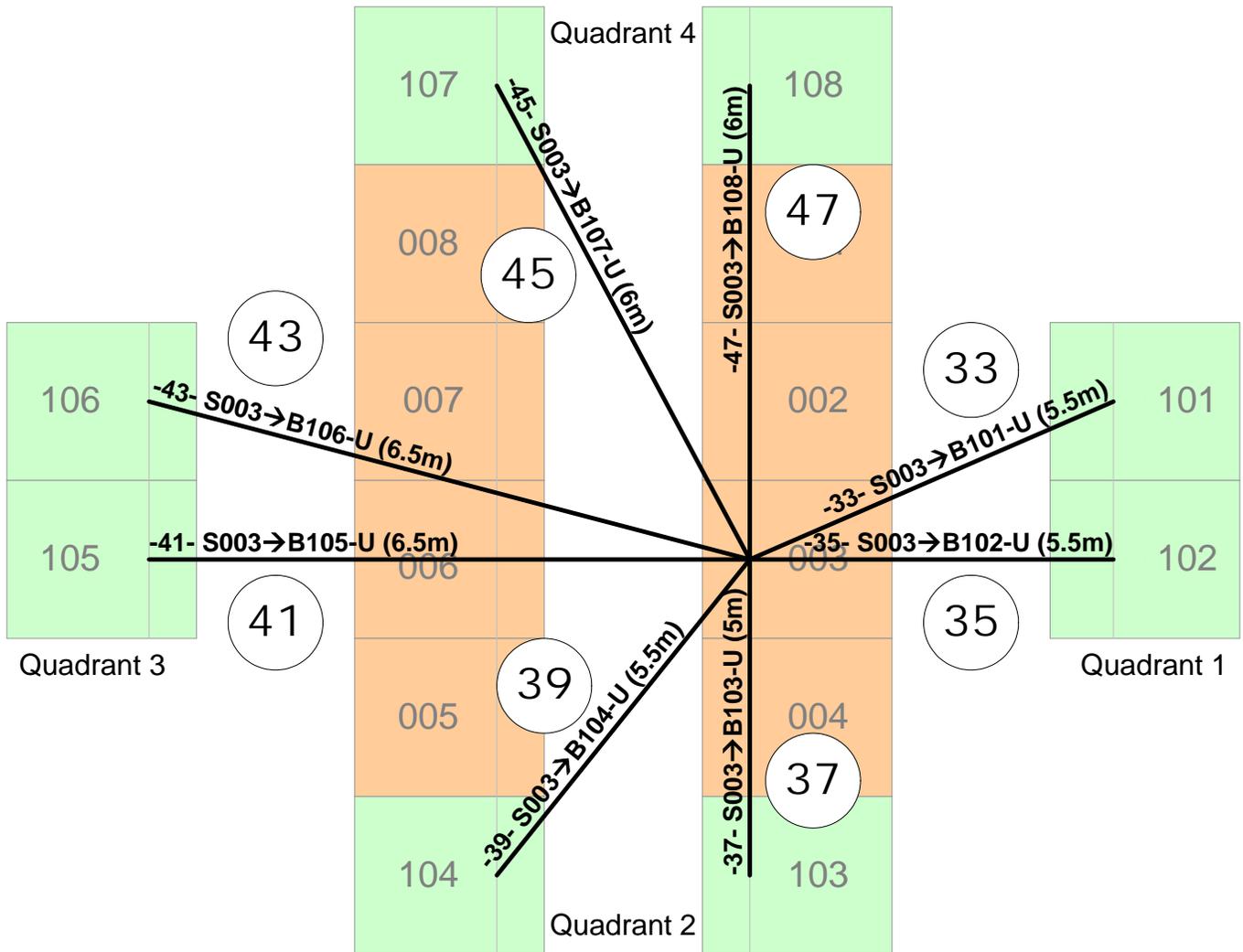


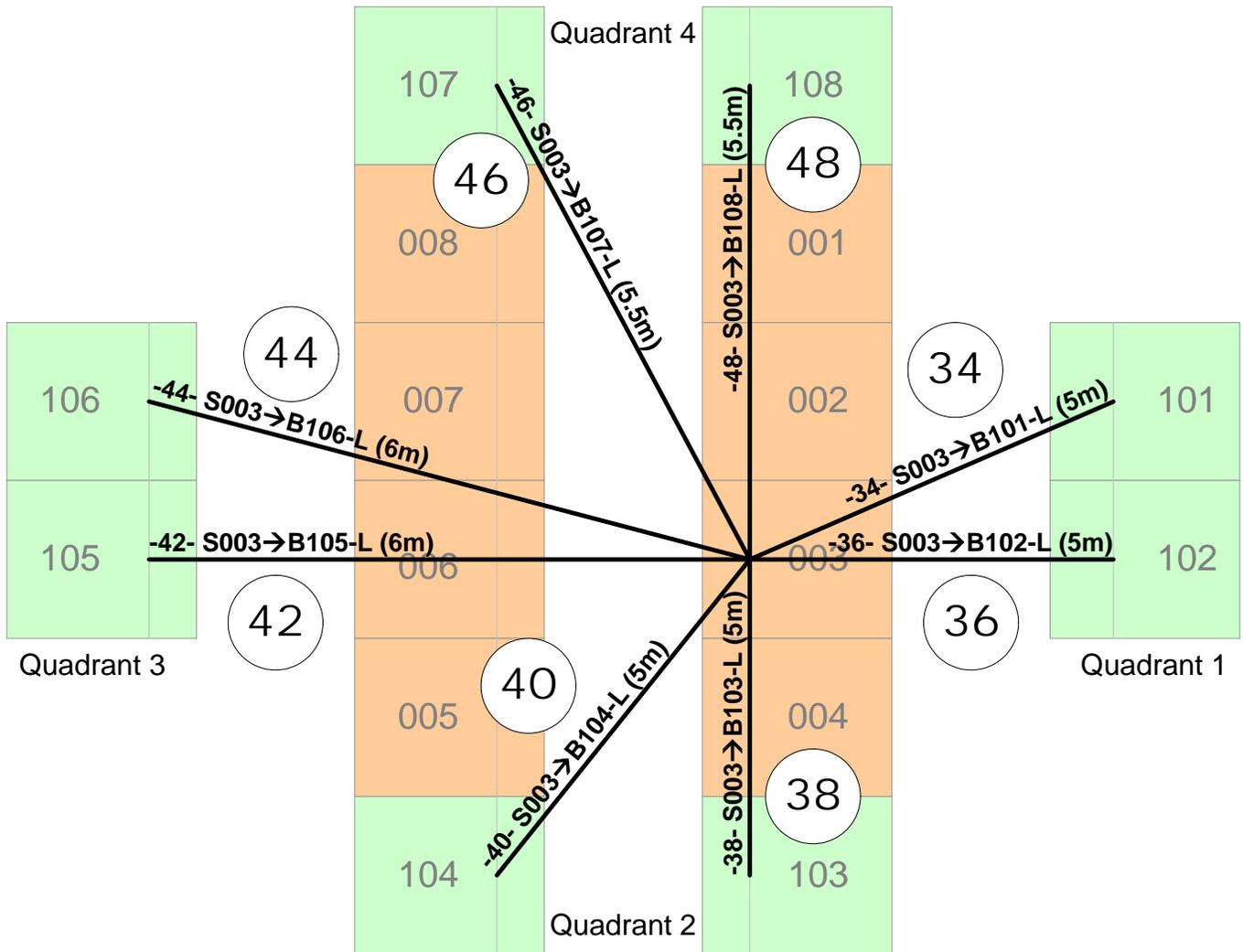
# **Kit S002, cable sets 17-32**



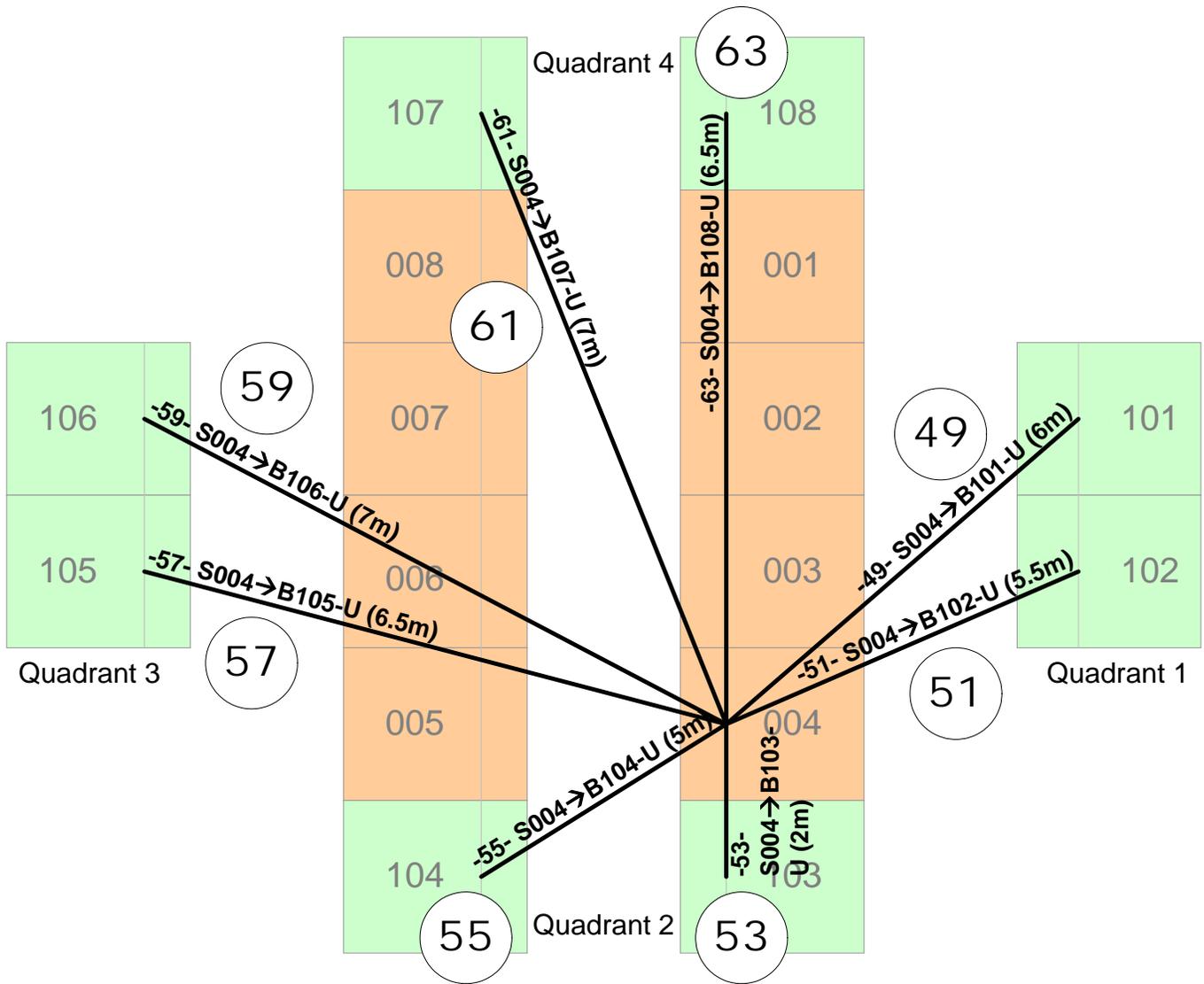


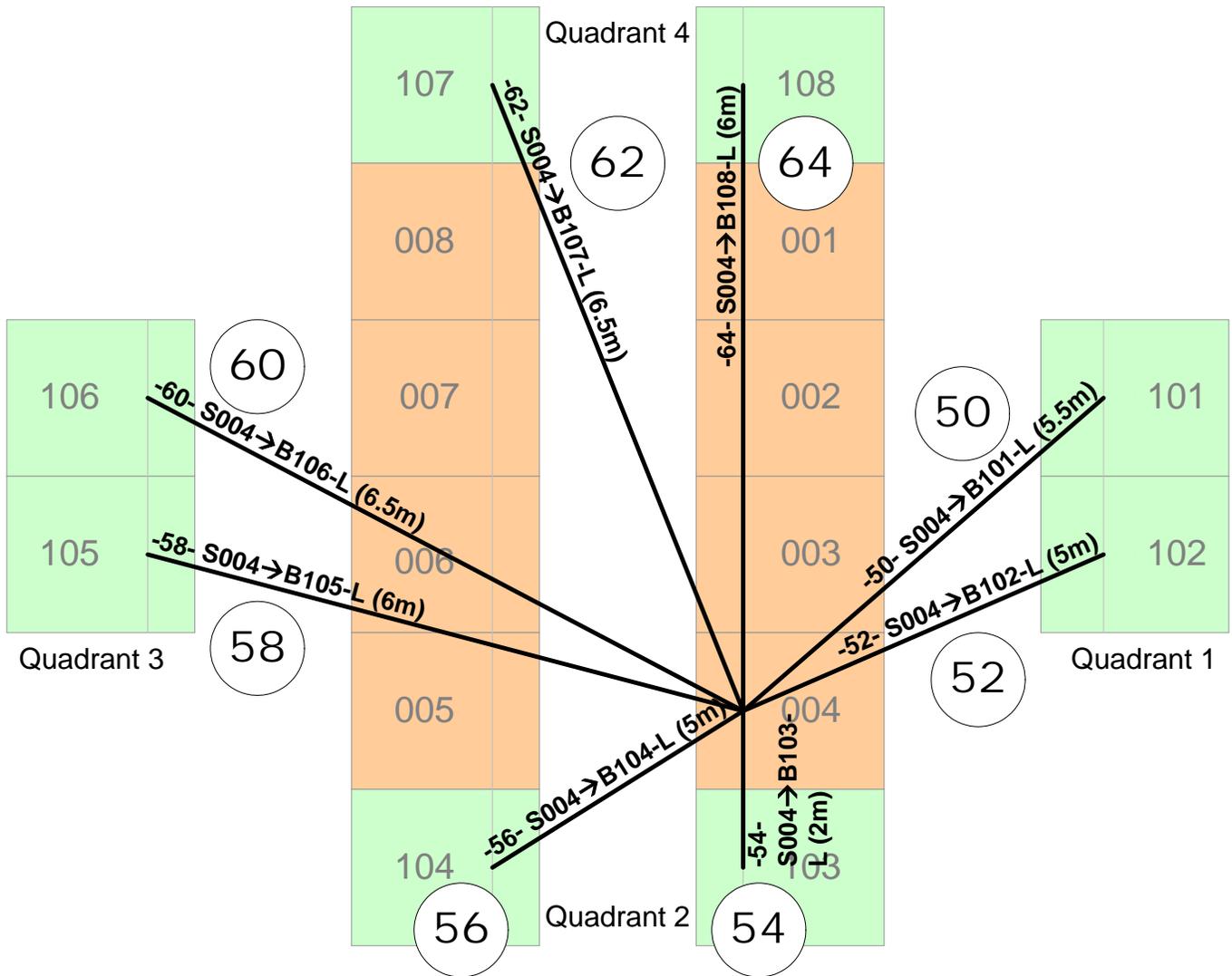
# **Kit S003, cable sets 33-48**



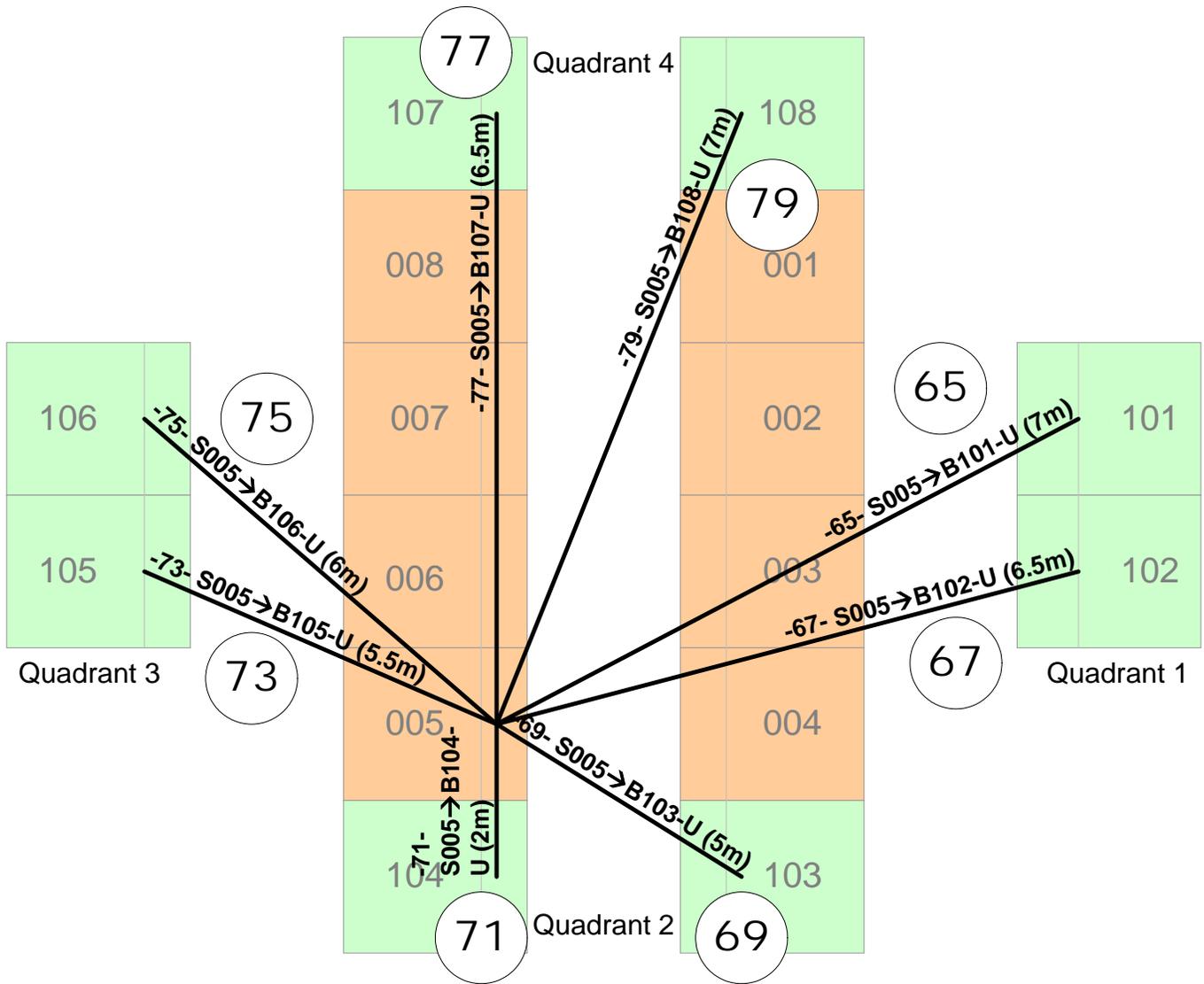


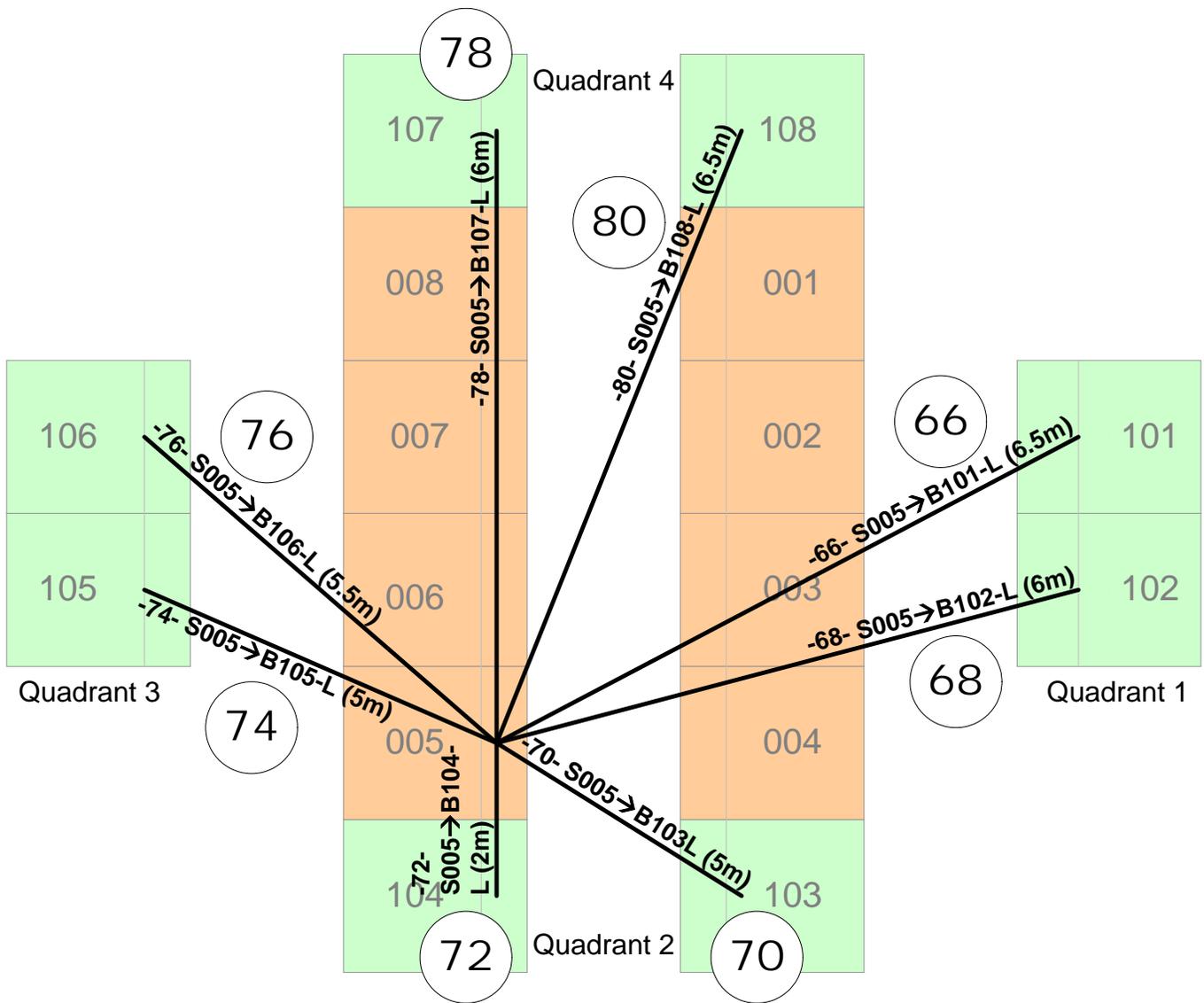
# **Kit S004, cable sets 49-64**



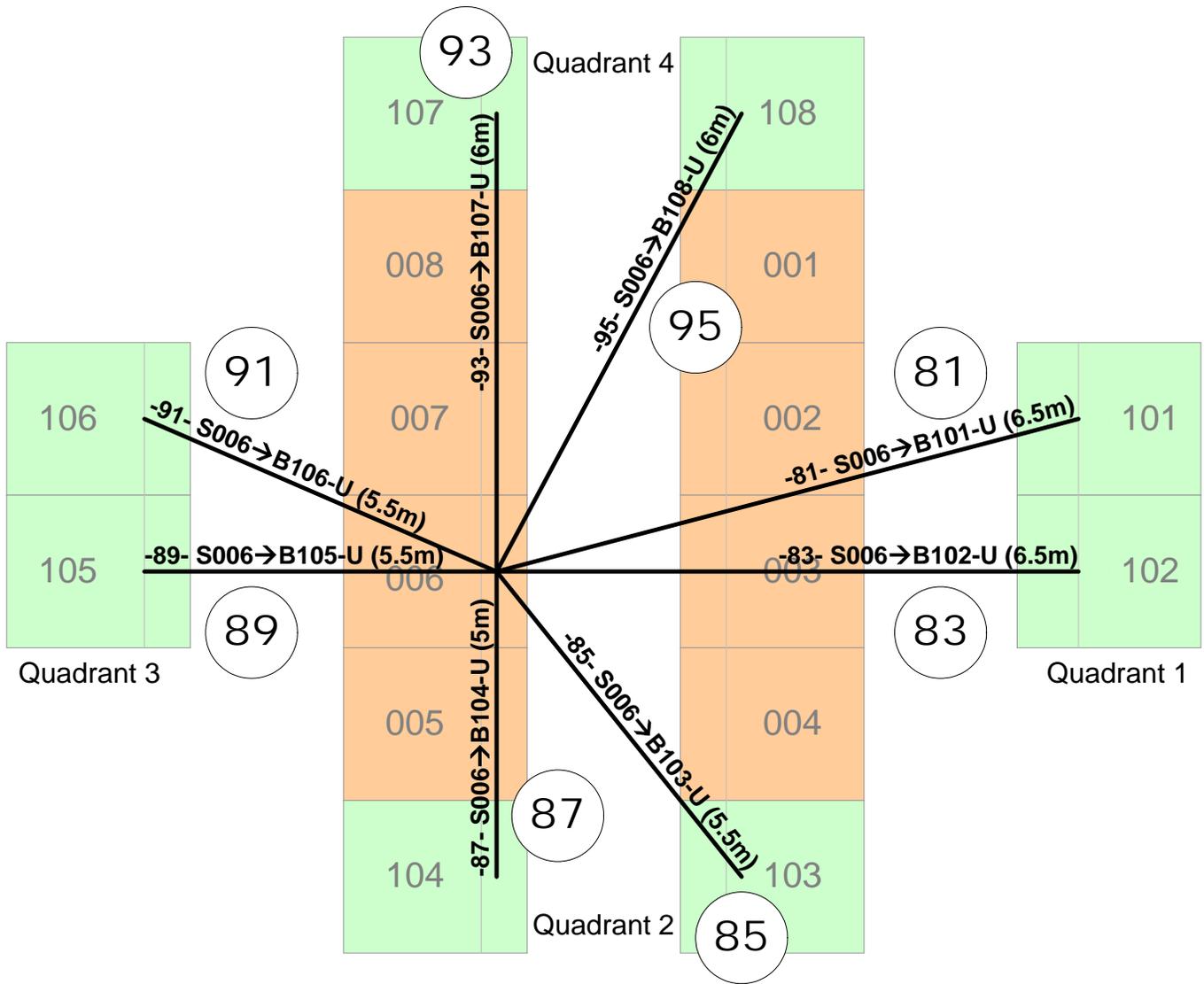


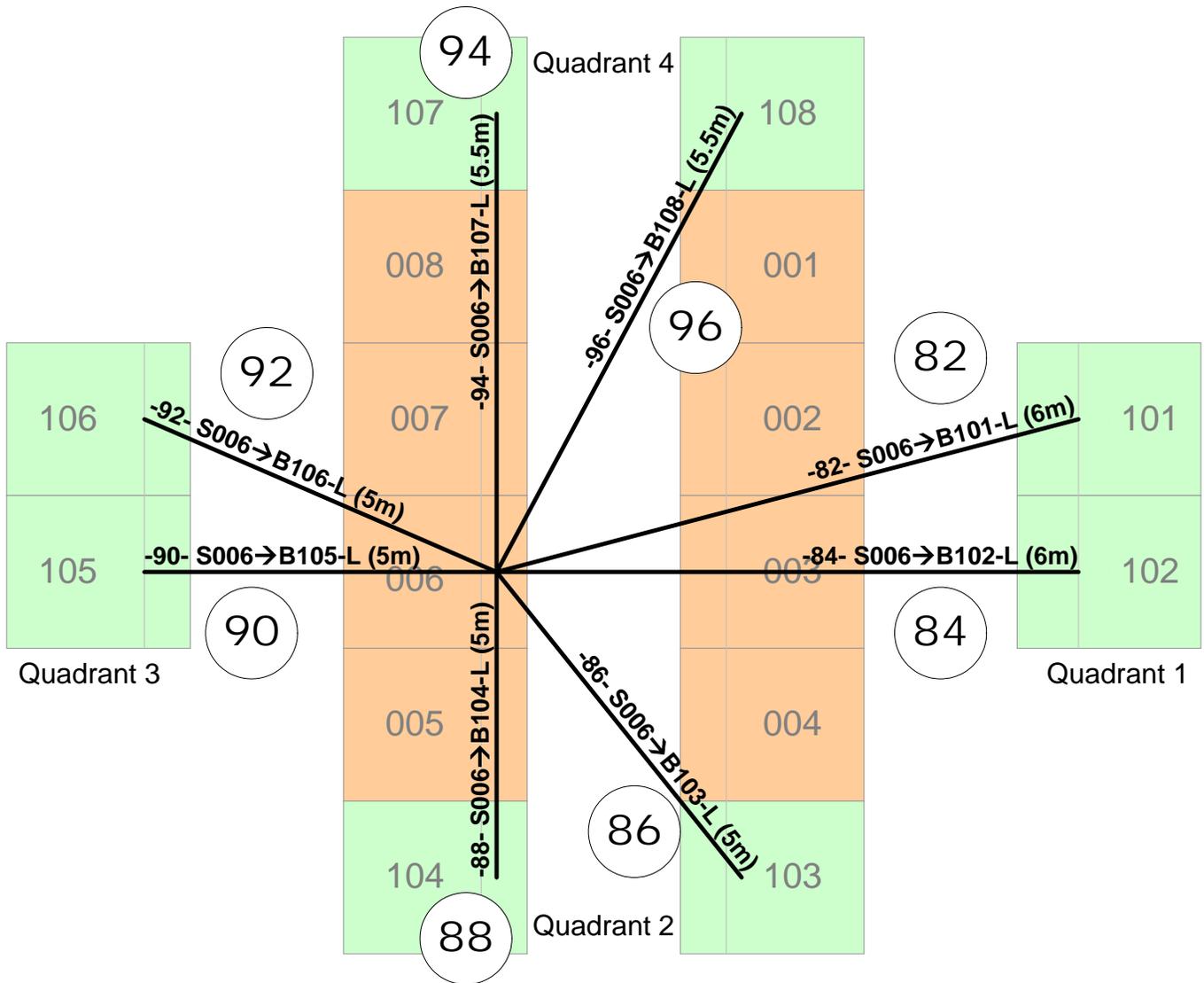
# **Kit S005, cable sets 65-80**



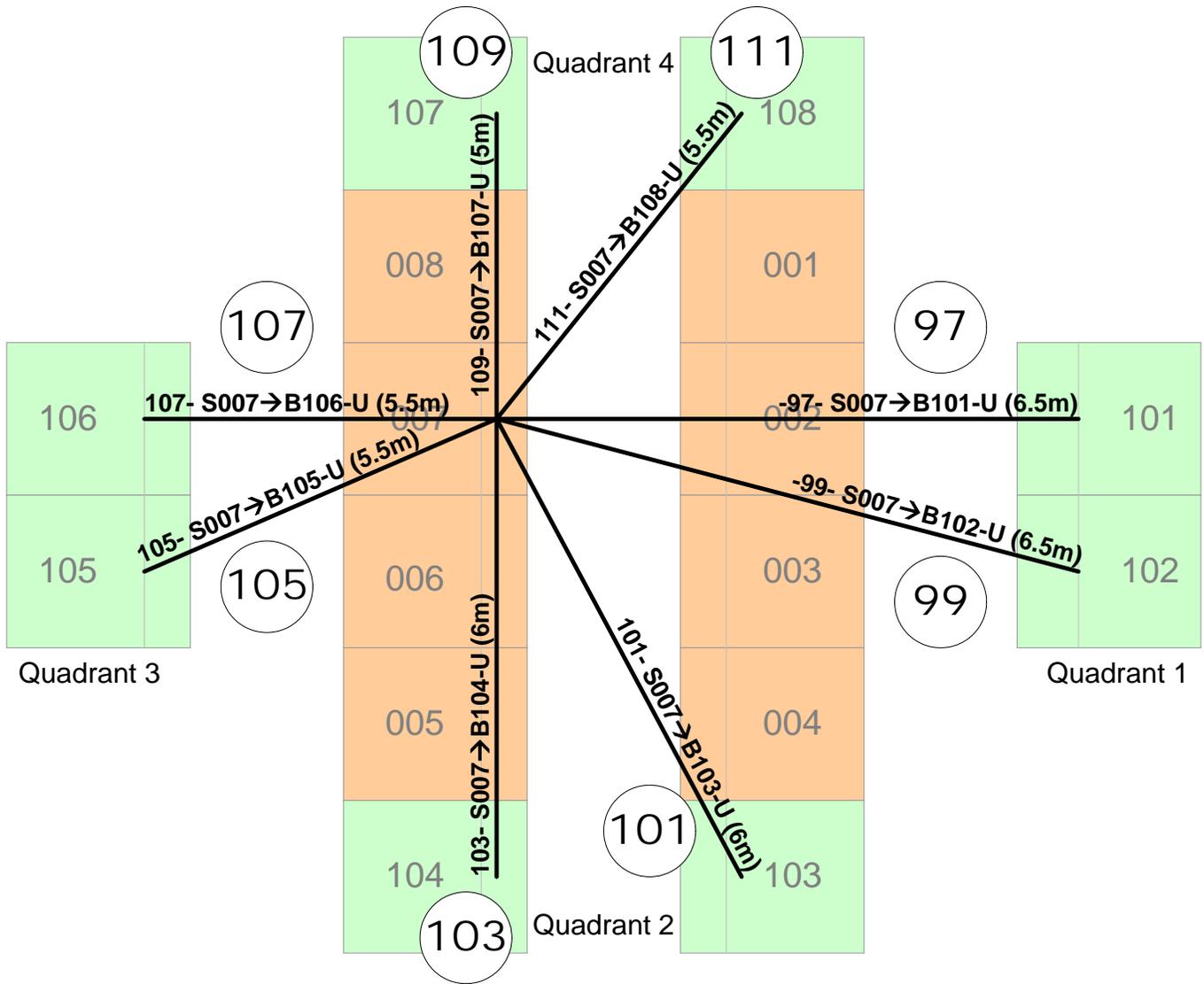


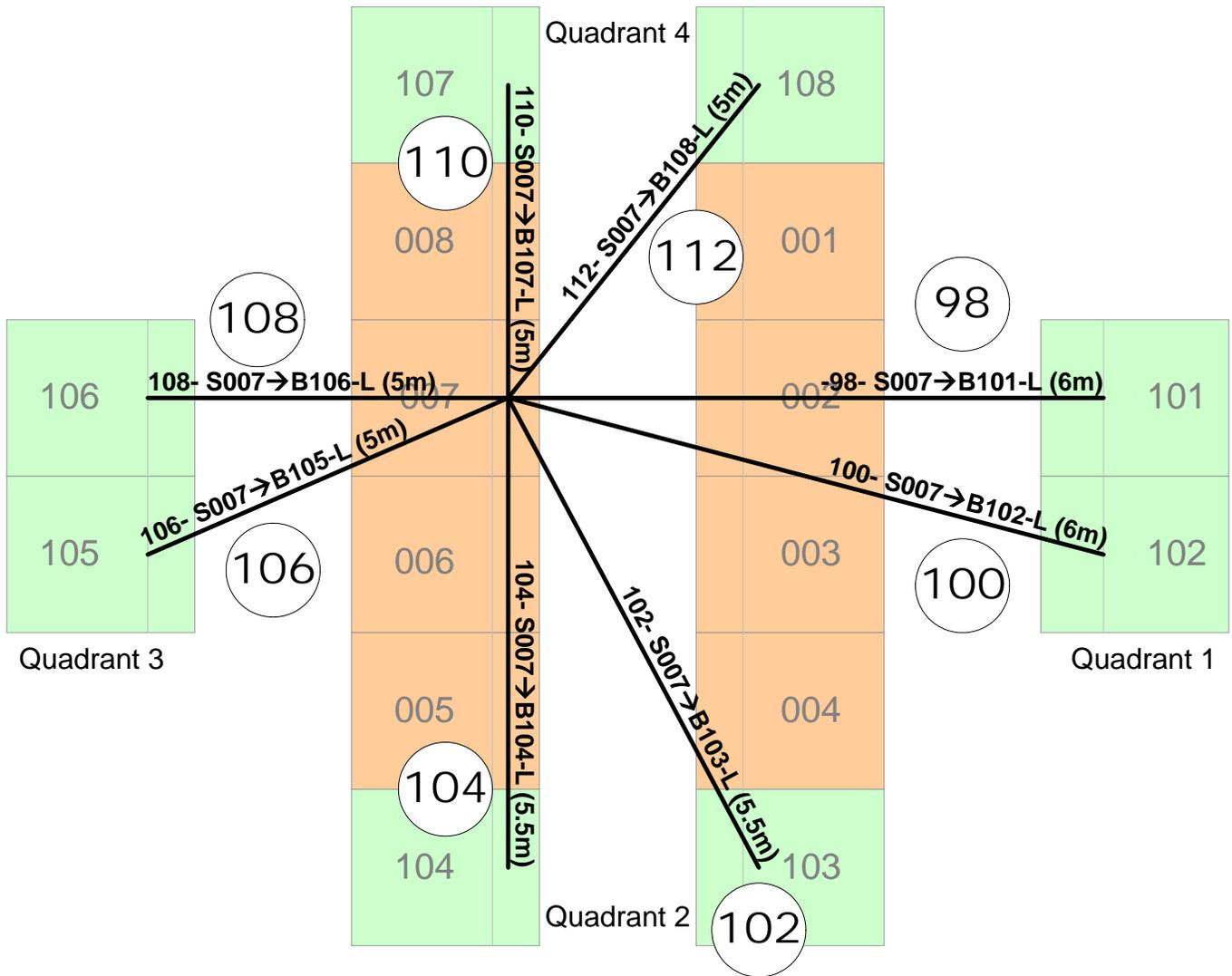
# **Kit S006, cable sets 81-96**



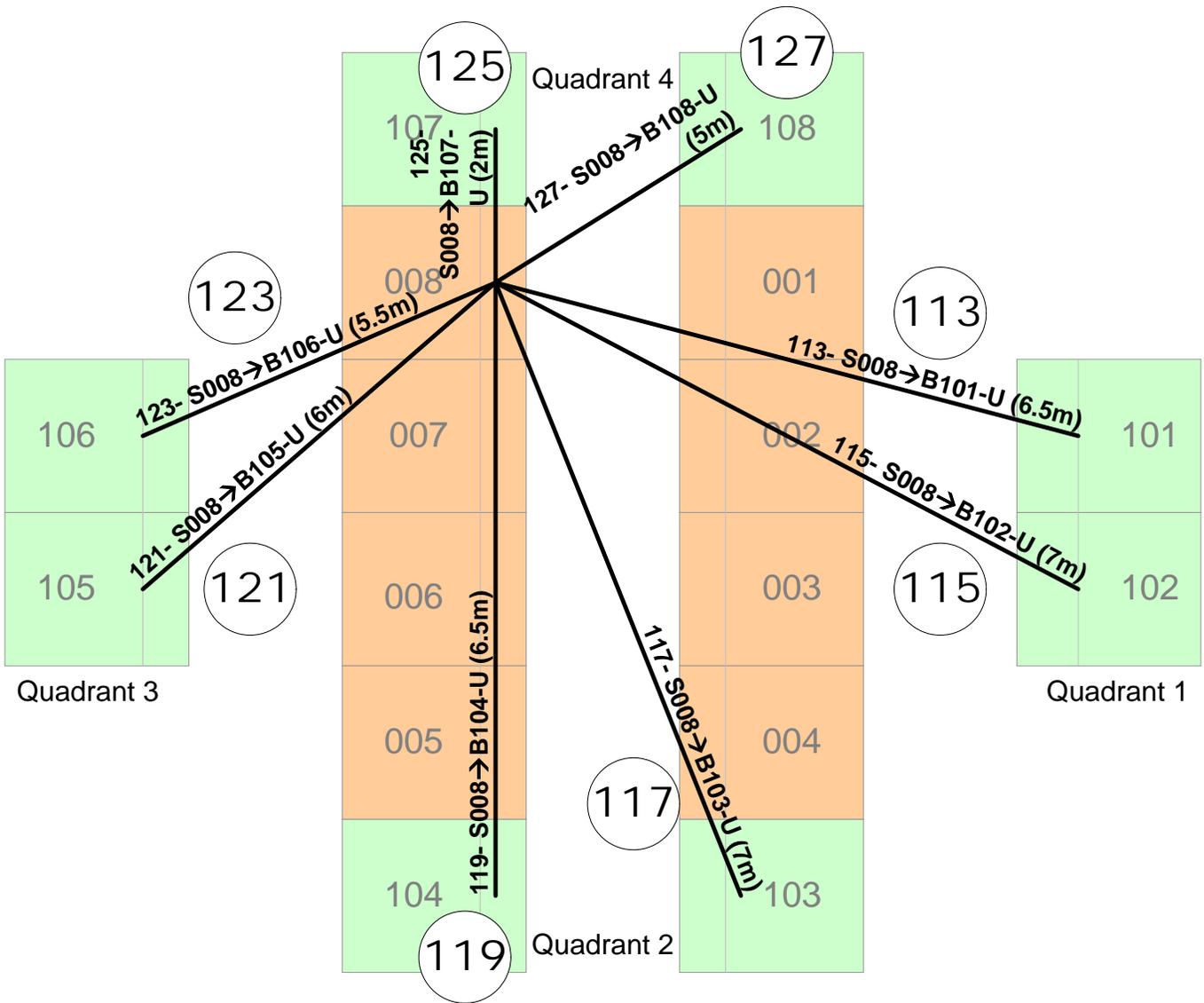


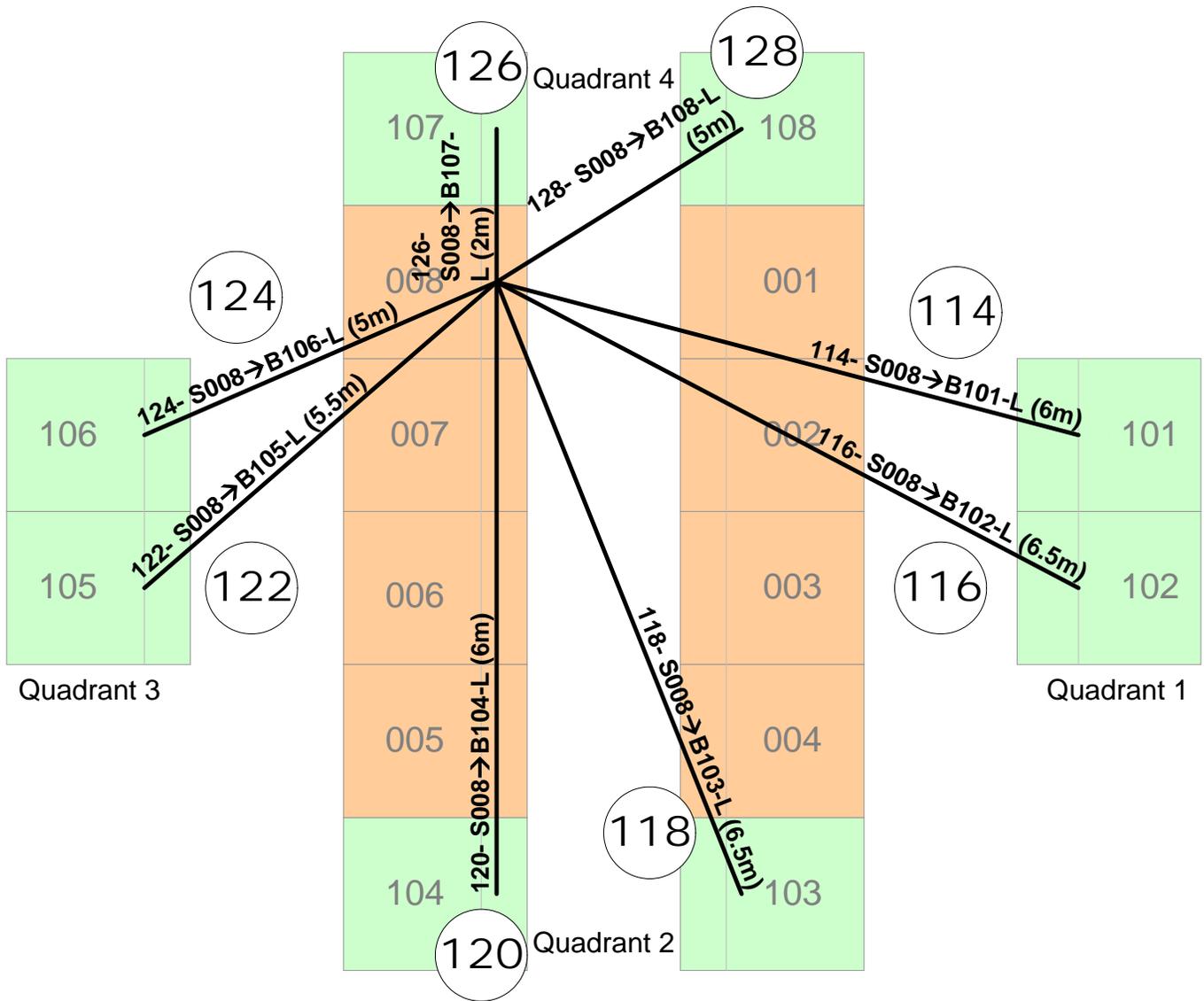
# **Kit S007, cable sets 97-112**





# **Kit S008, cable sets 113-128**





## 4.2 POST-RACK INSTALLATION: Plugging Cables into S and B racks

Once one or more racks are installed, rack-to-rack cables can be installed in rack headers.

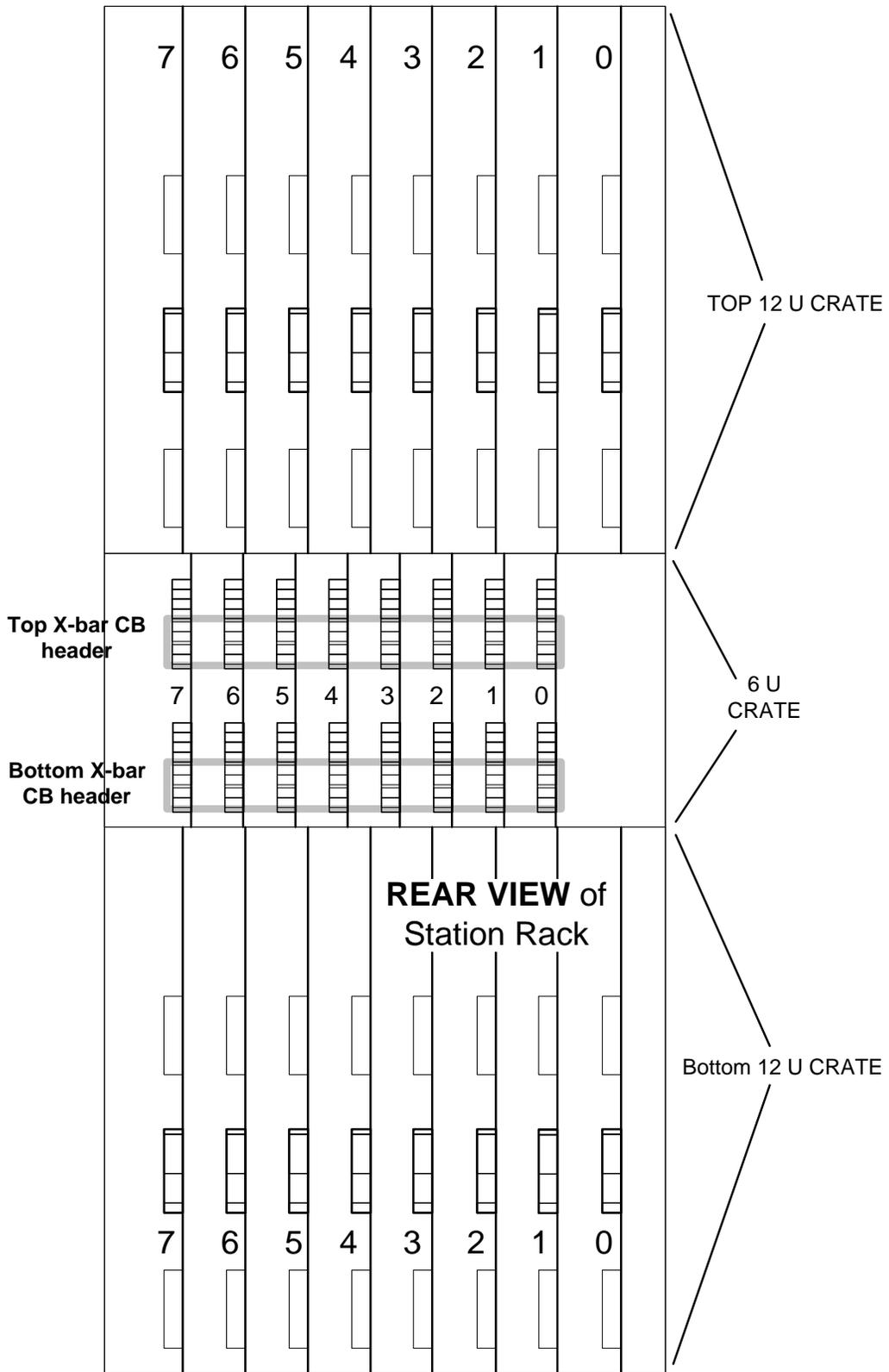
S-racks and B-racks have different install requirements, and each is treated separately.

### 4.2.1 *S-Rack Cable Header Installation*

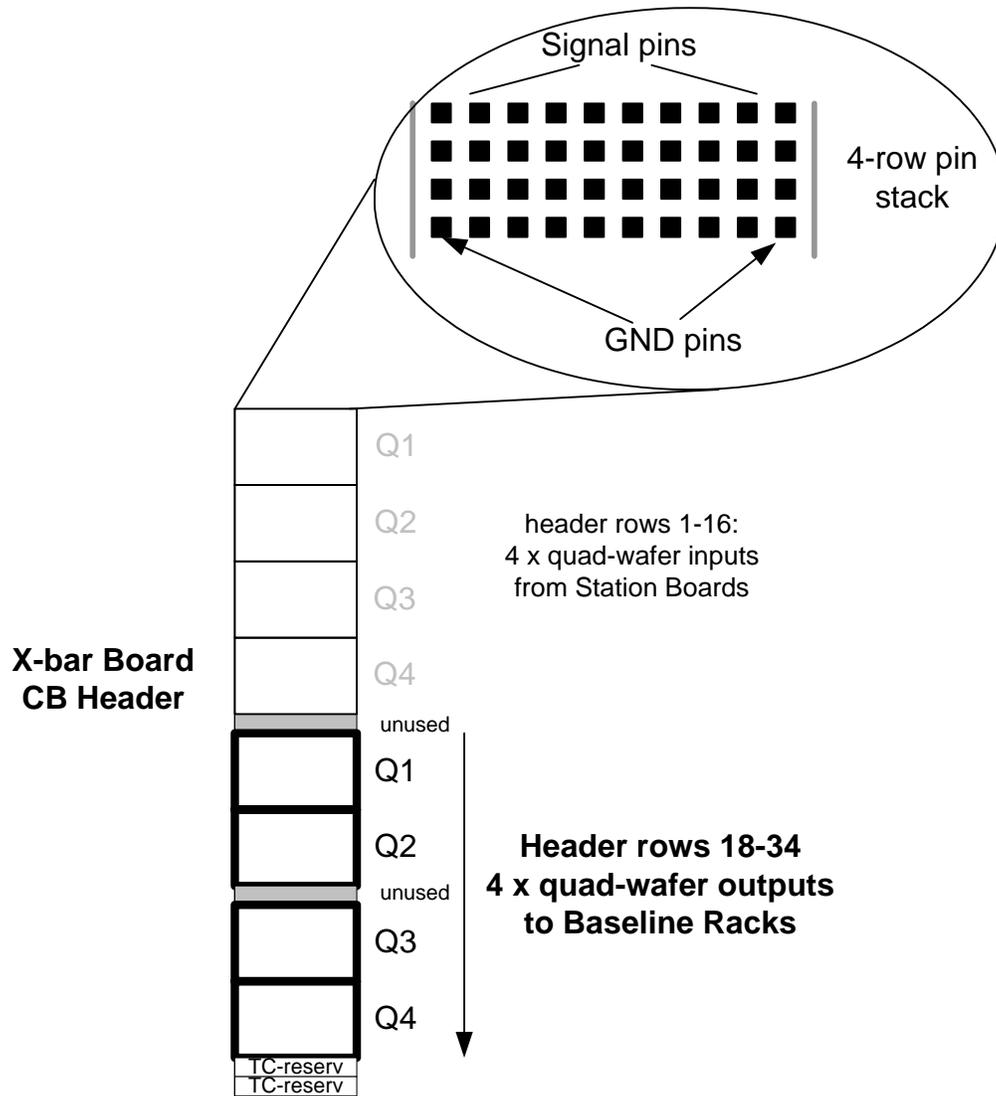
A rear-view of the **S-rack** is shown in Figure 4-1. All rack-to-rack cables plug into the center 6U crate in the header locations shown.

A more detailed view of the center crate header is shown in Figure 4-2.

Cables are installed with the  
cable connector *PLASTIC* facing  
UP in all cases.



**Figure 4-1 View into the REAR of an S-rack, showing locations where cables are plugged in.**



**Figure 4-2 Center 6U crate header pinouts. The Q1-Q4 “quad-wafer” pins are where cables are installed.**

The following 64 pages contain connection diagrams for installation of ALL cables into ALL S-racks.

For clarity, each diagram shows the installation of 8 quad-wafer cables, from 2 cable sets.

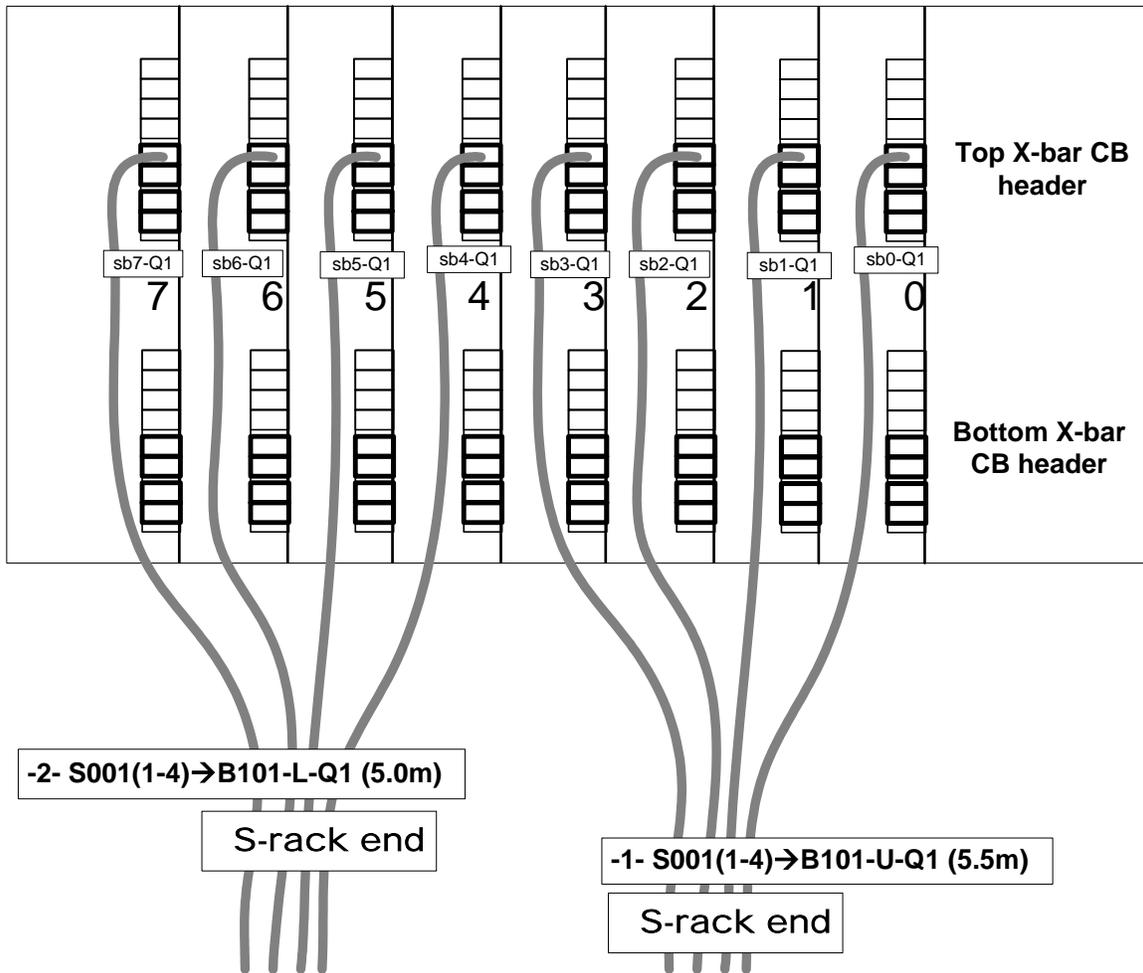
Check off each diagram as each cable set is installed in each rack. Cable installation within each rack follows a logical sequence, but all cable installs are diagrammed for completeness. NRC-Penticton personnel will be on hand to assist with this install.

Use **extreme care** when installing cables into Common Backplane (CB) headers!

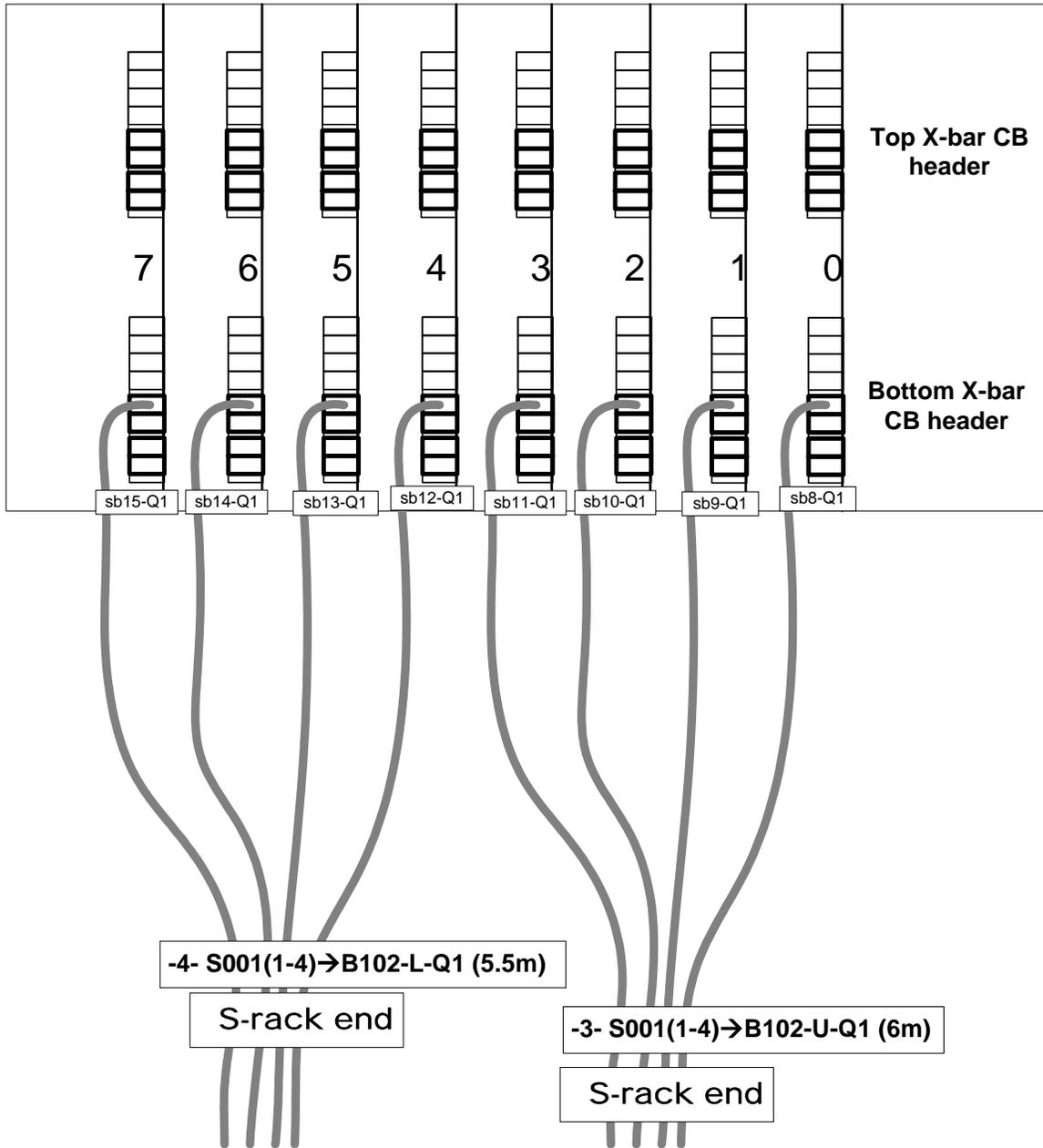
If the connector won't engage, it likely means misalignment, and **further mechanical force will damage CB header pins.**

✓ Once cables for a rack are installed, secure them with strain relief bars provided.

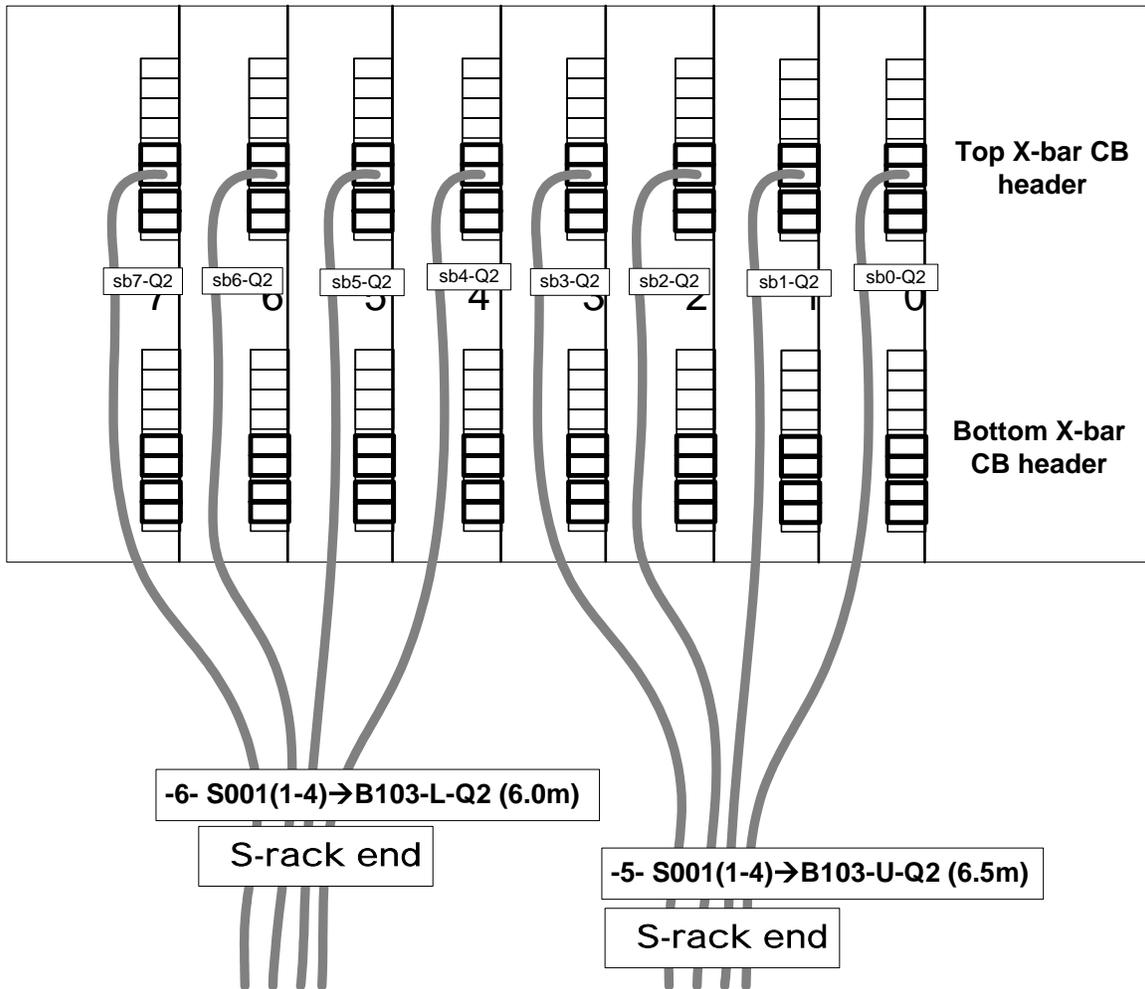
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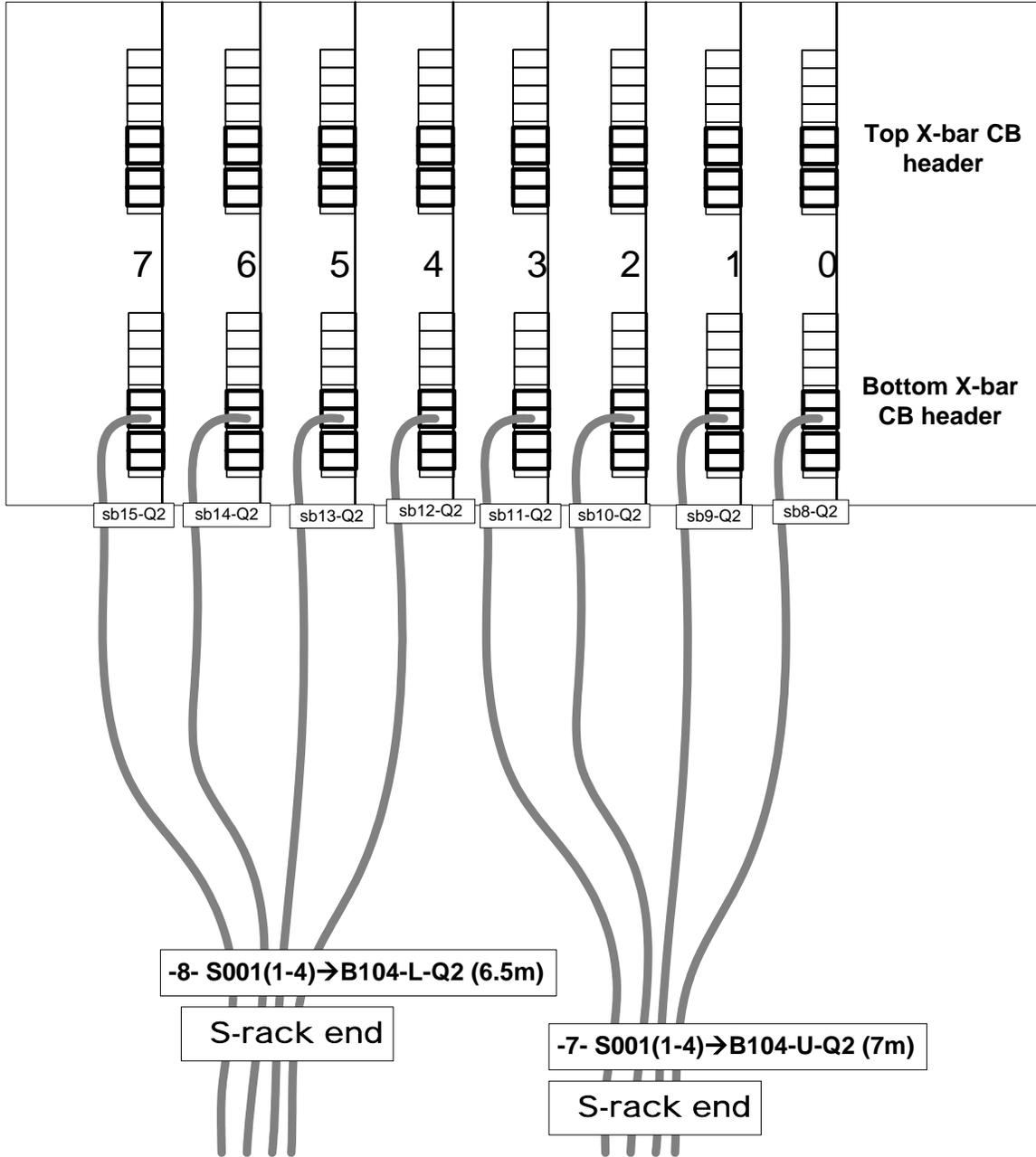
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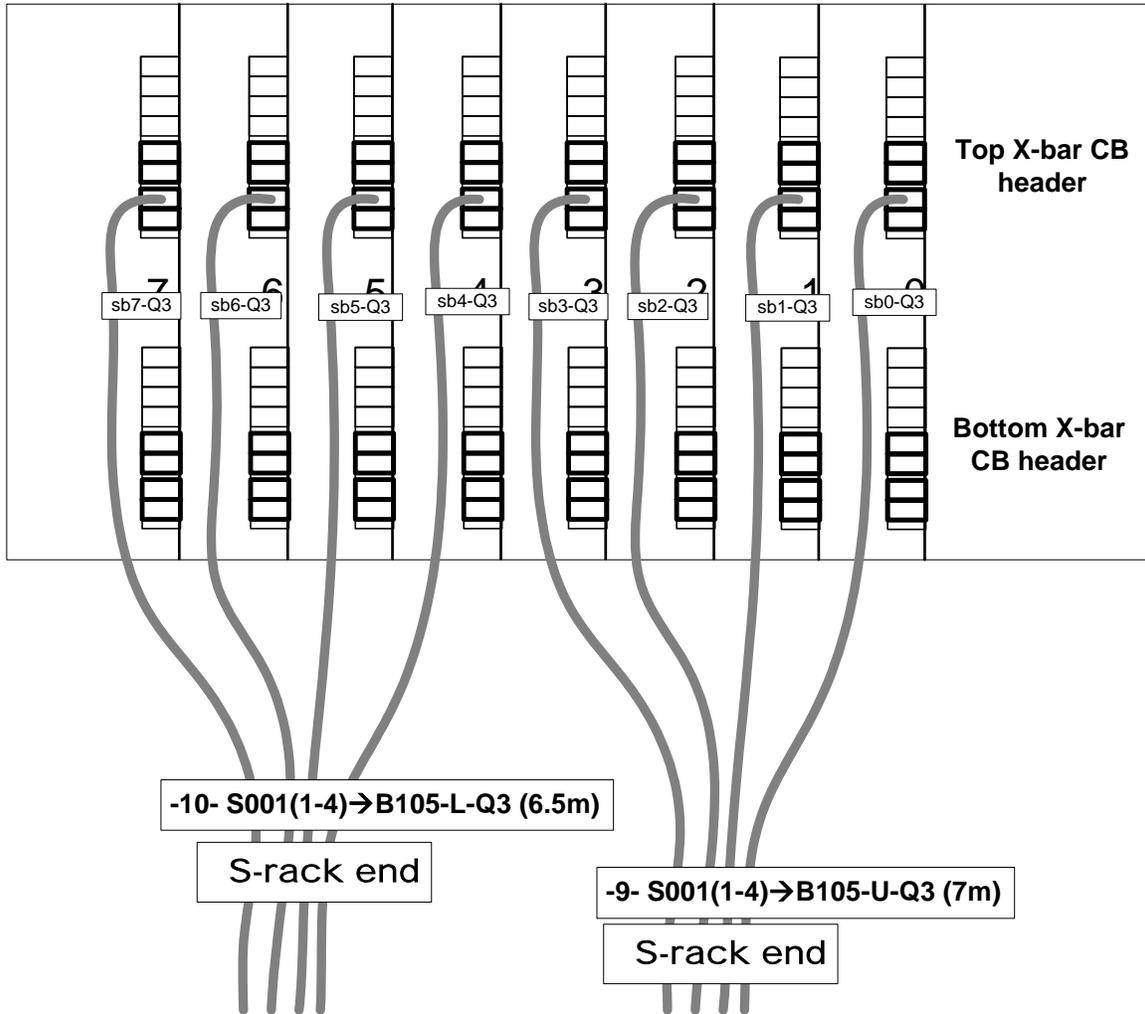
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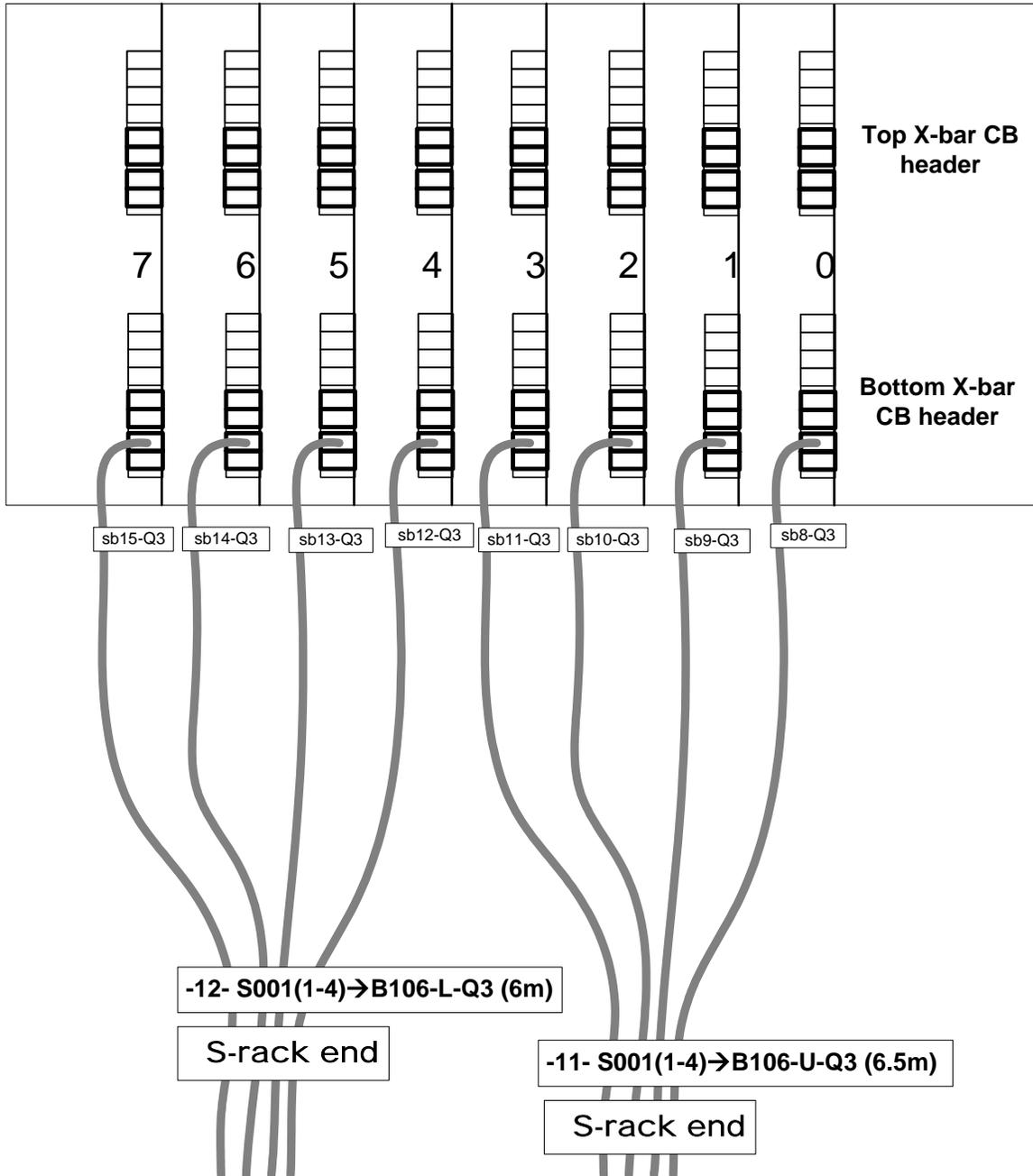
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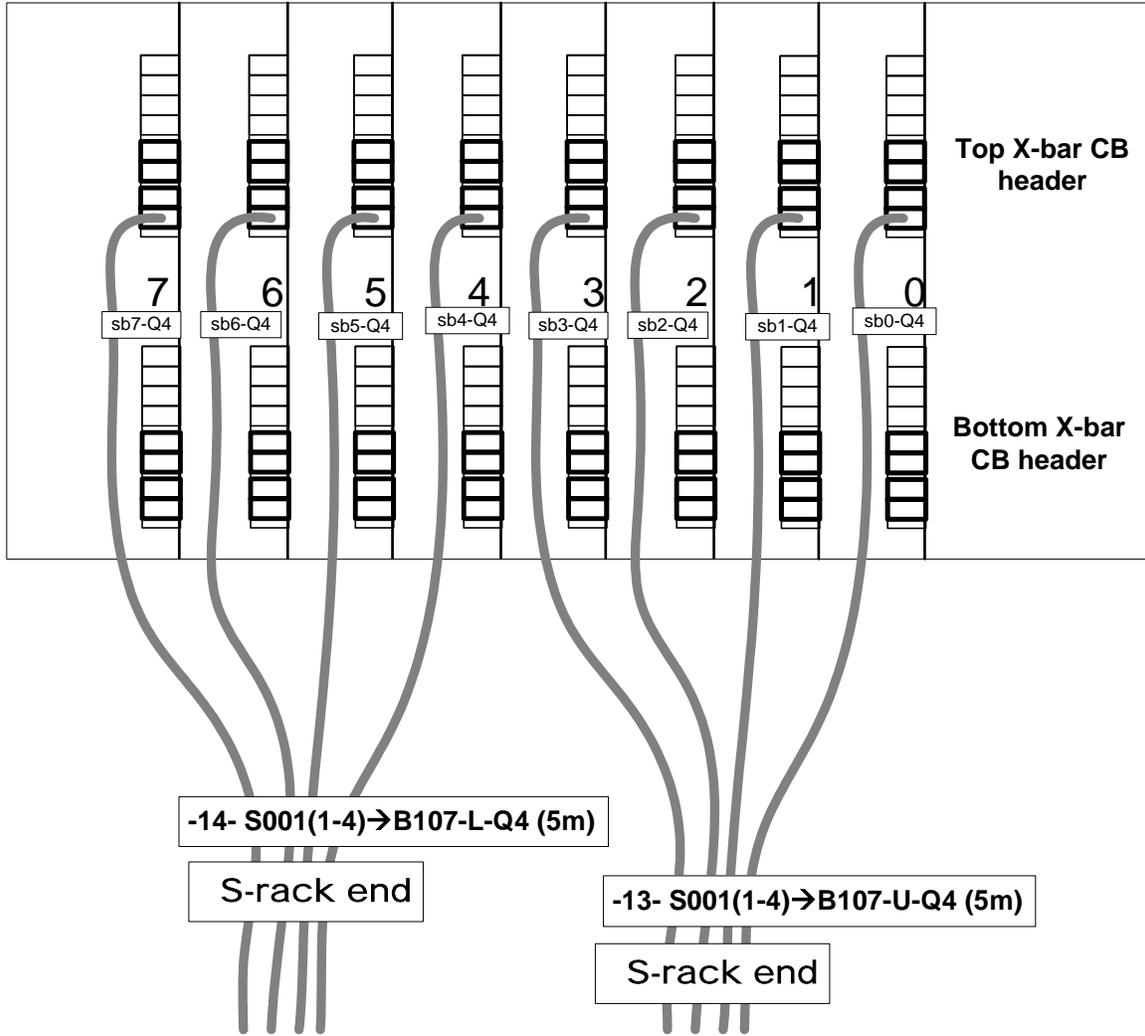
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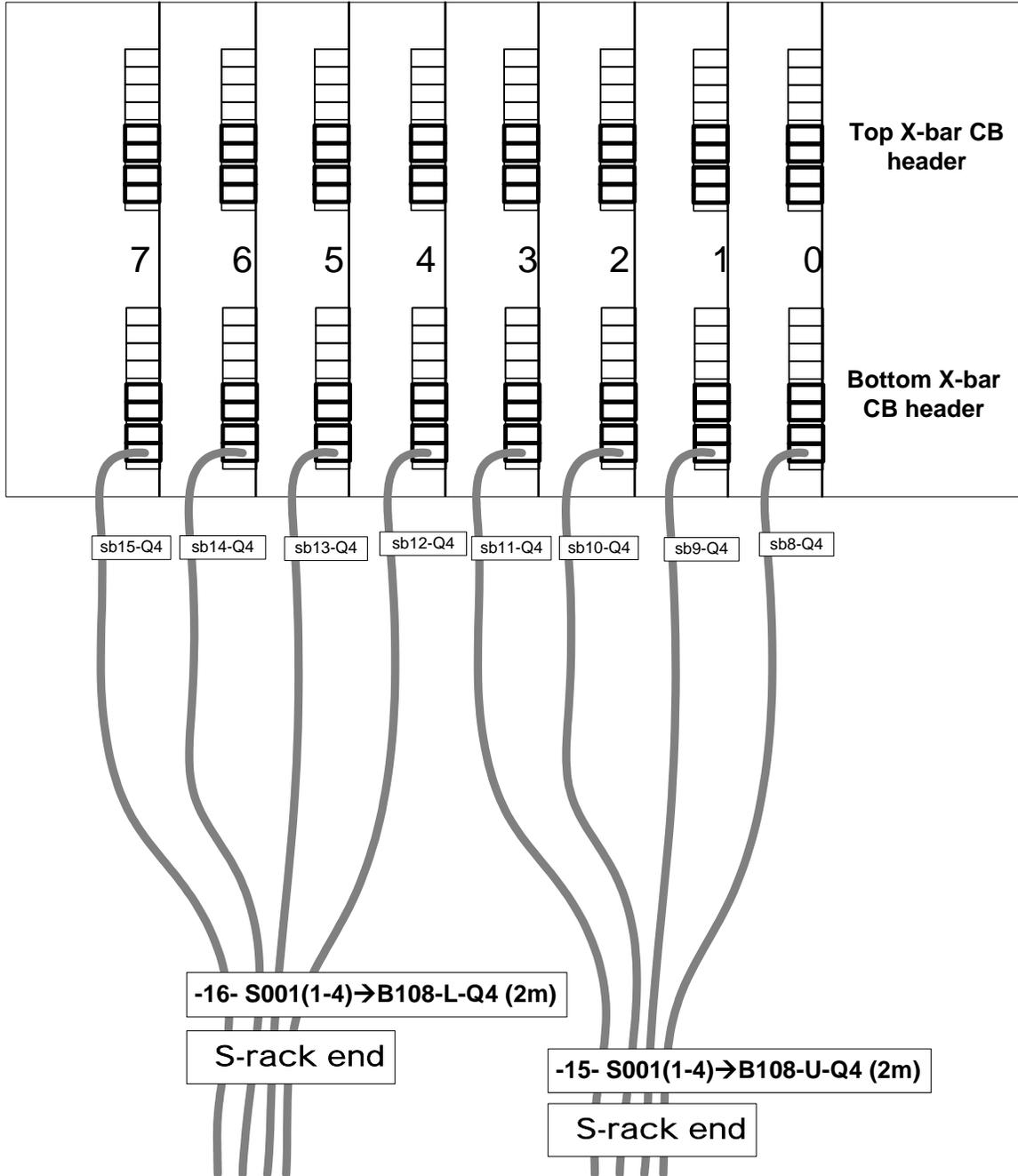
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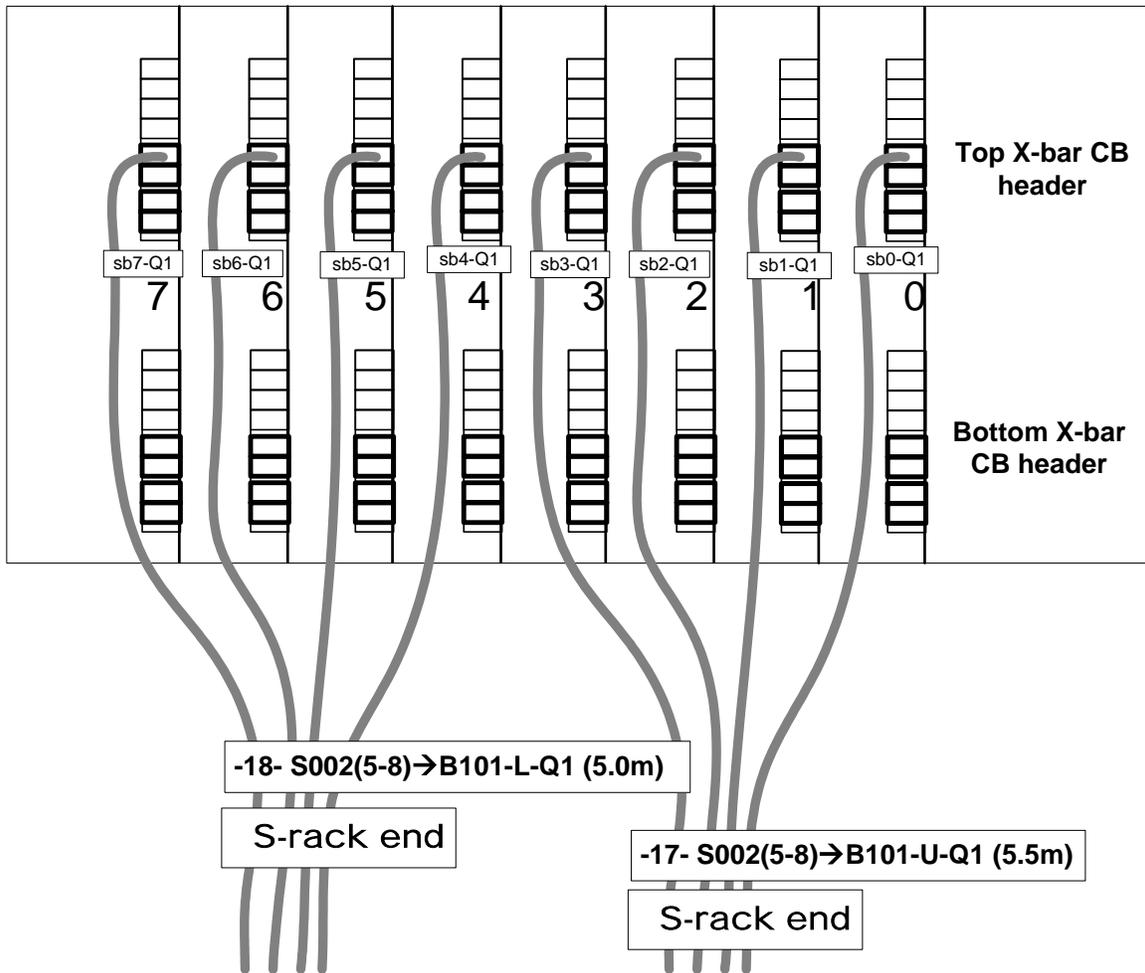
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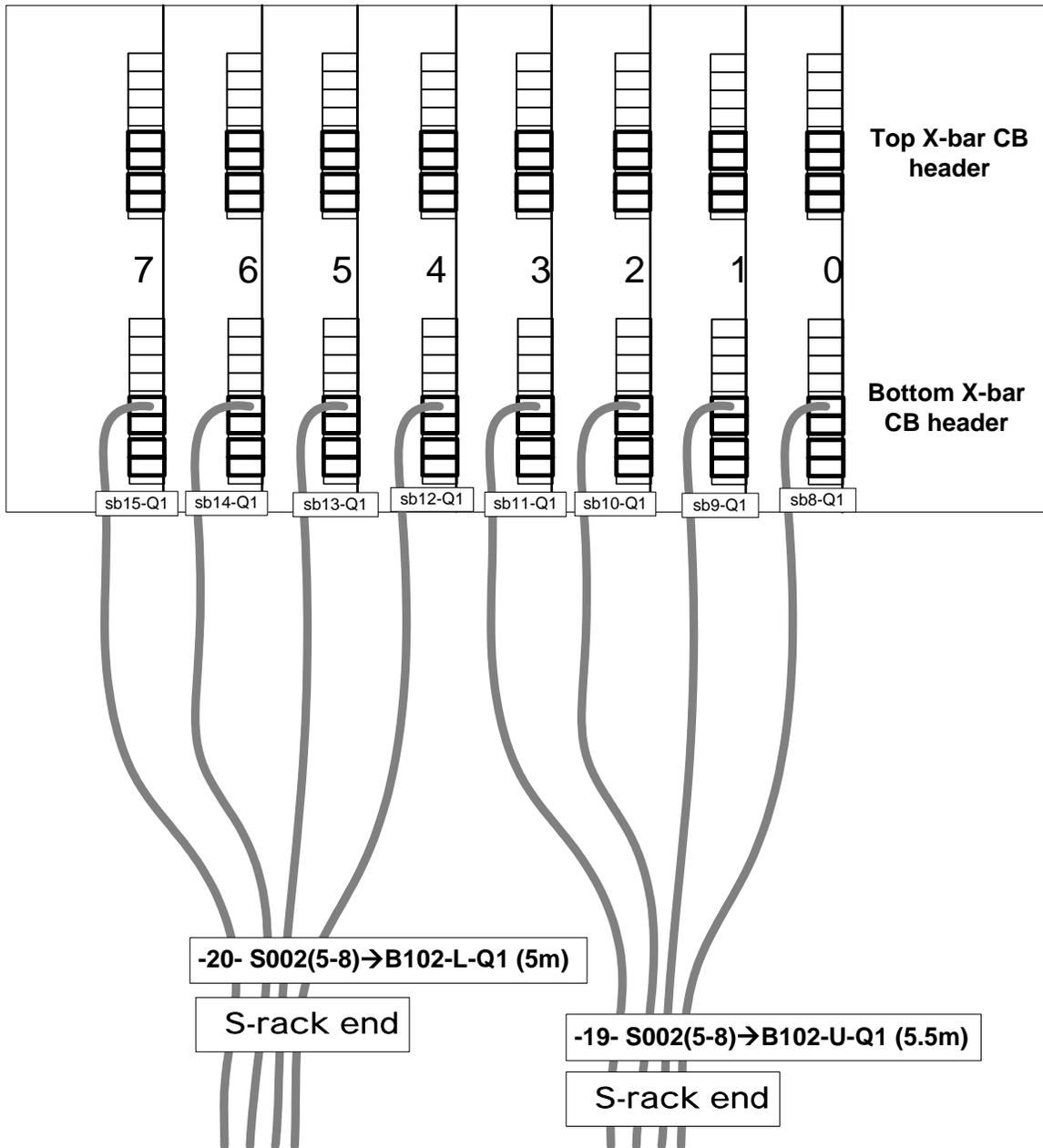
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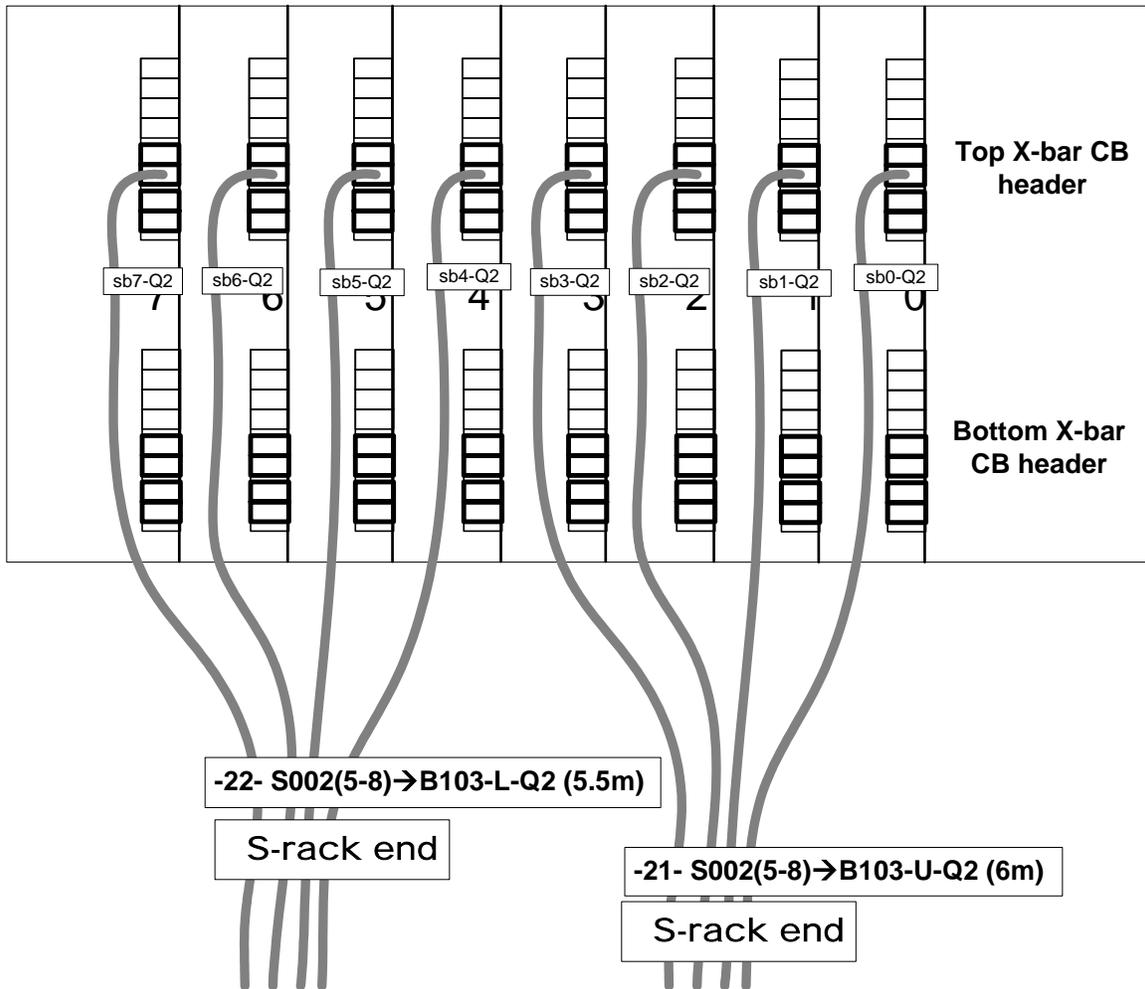
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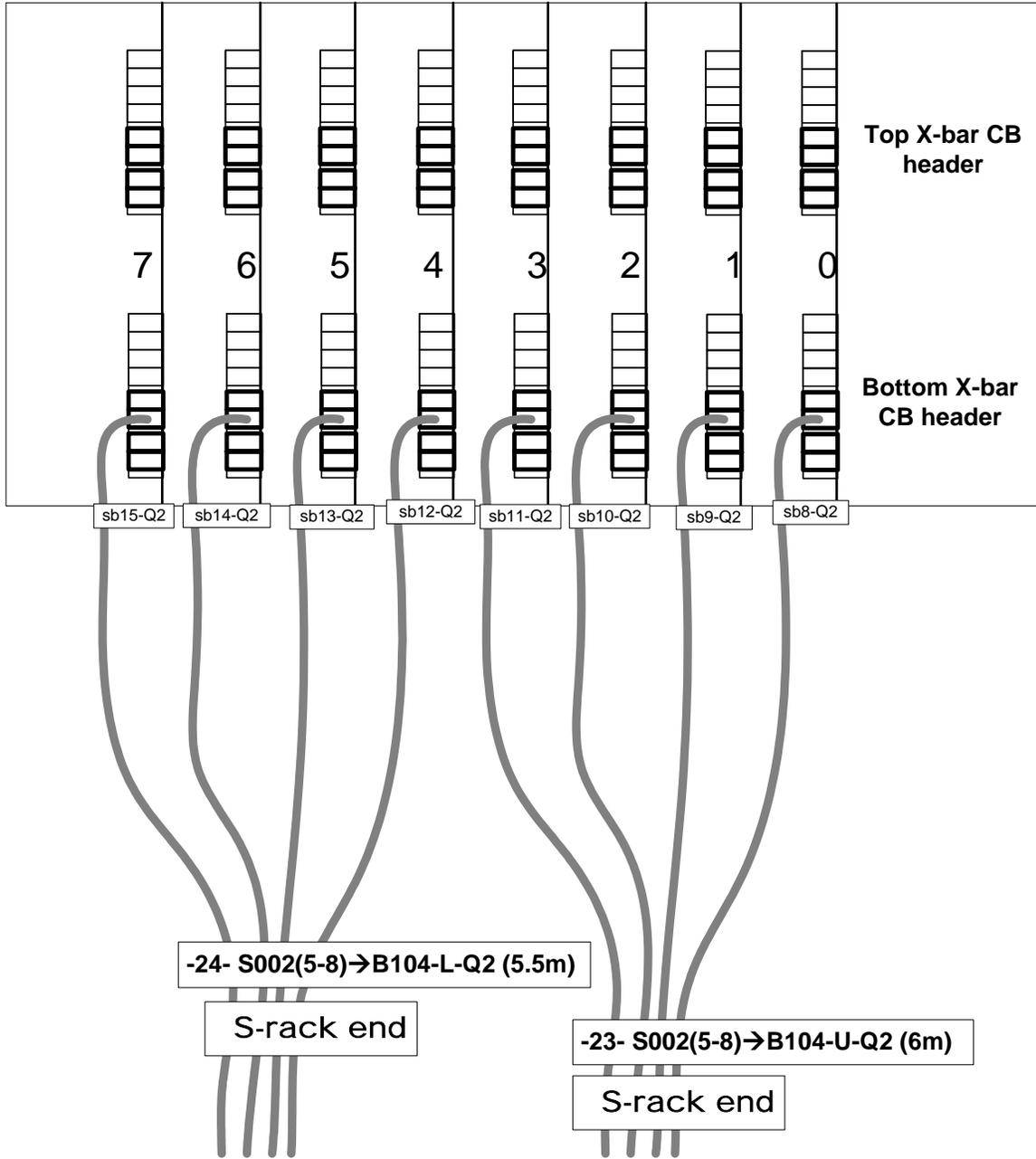
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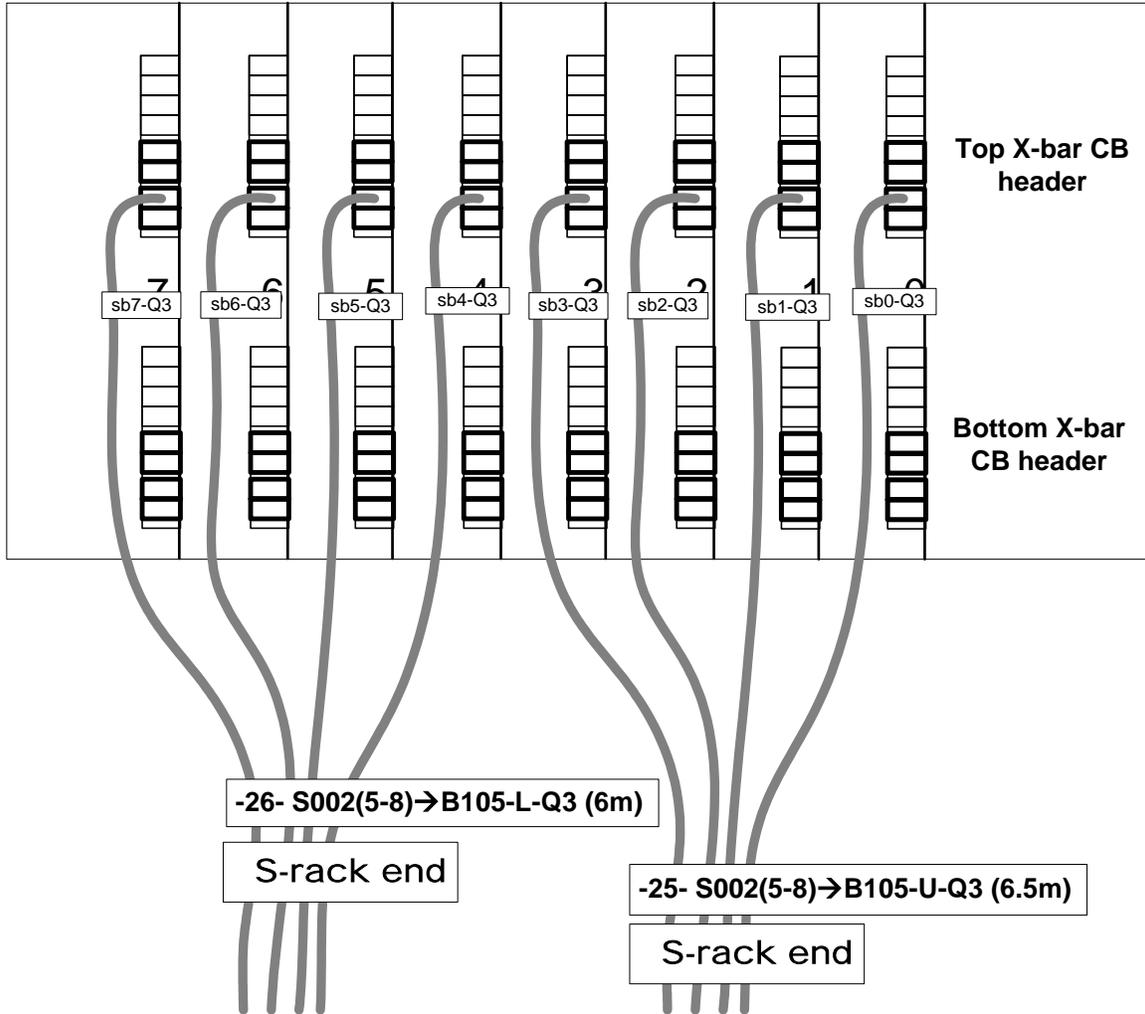
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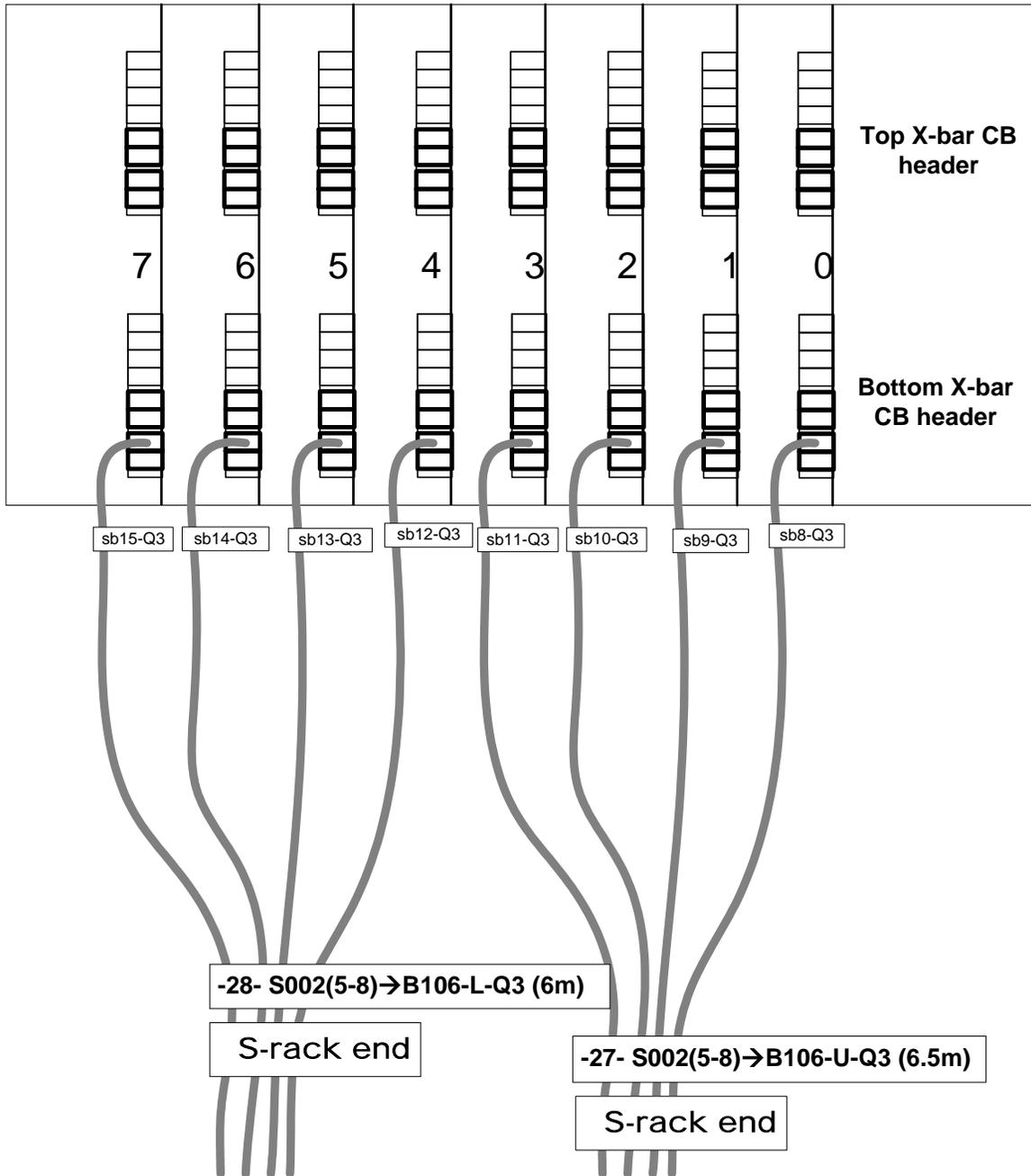
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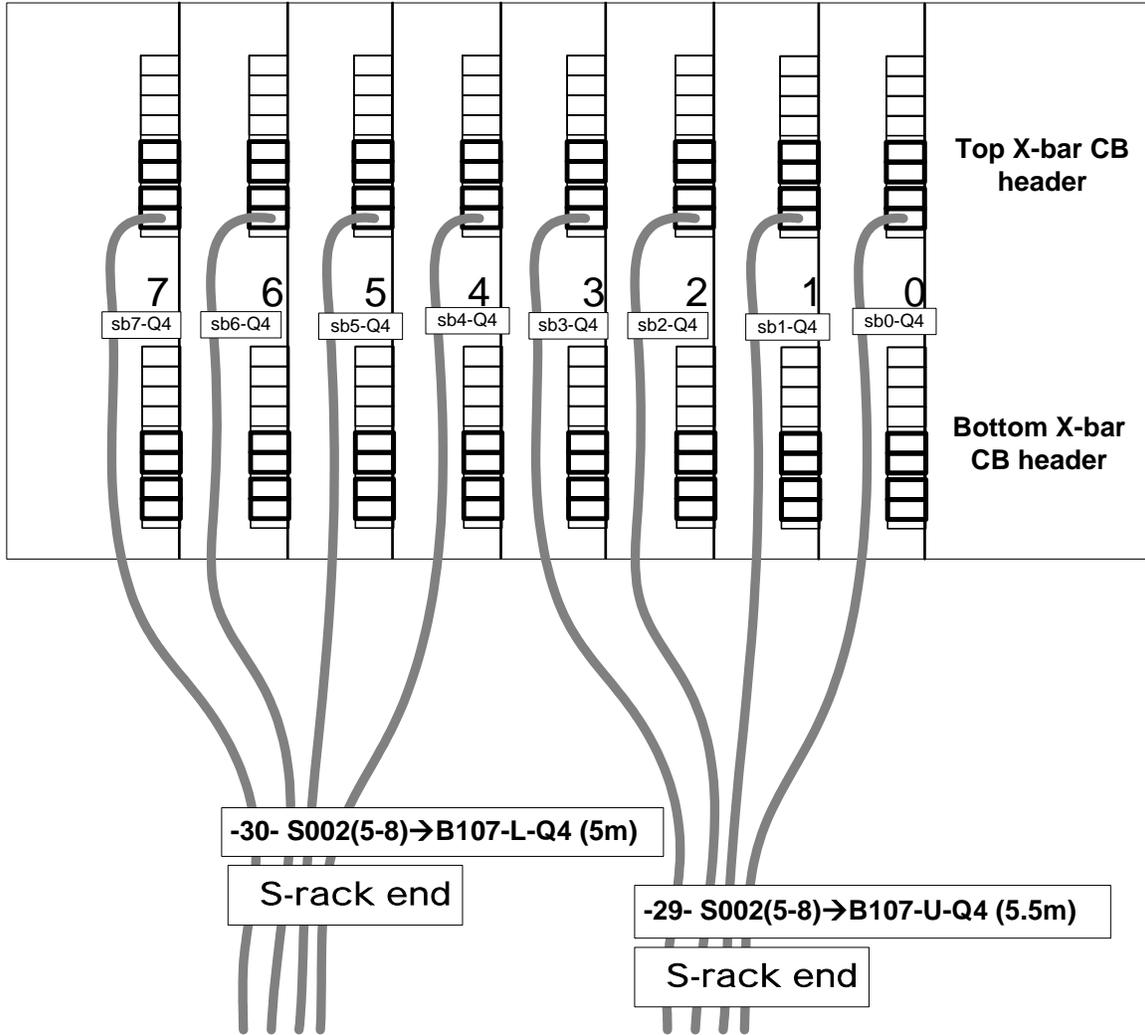
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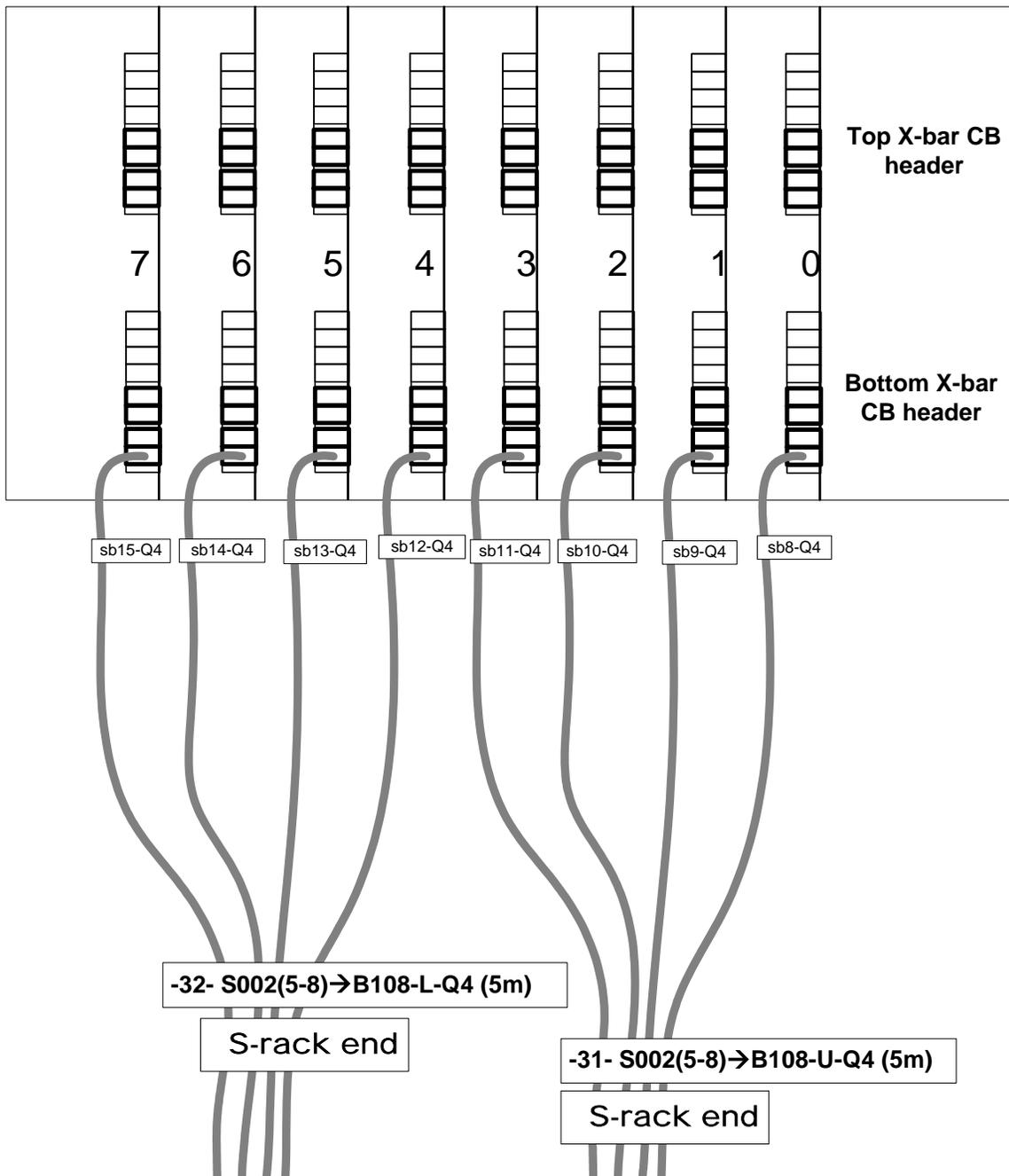
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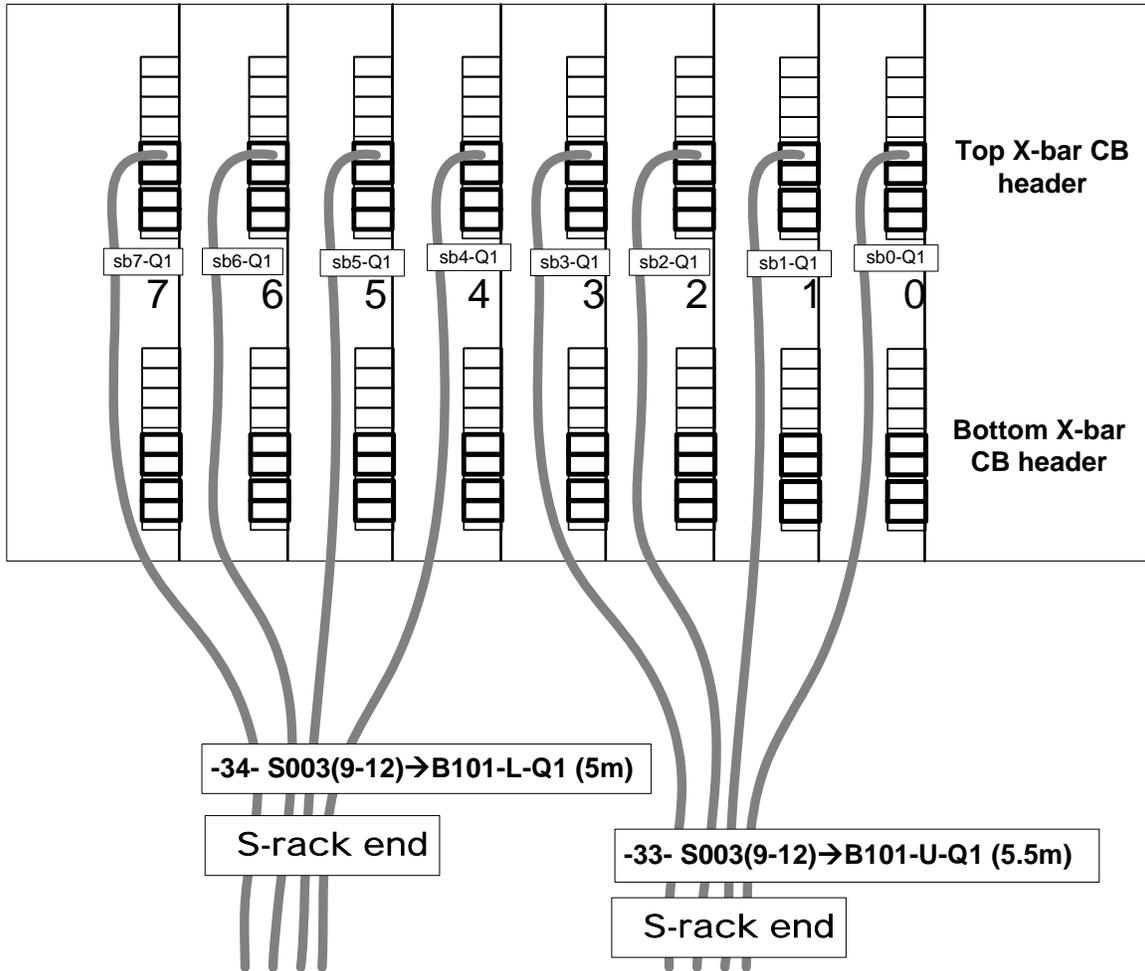
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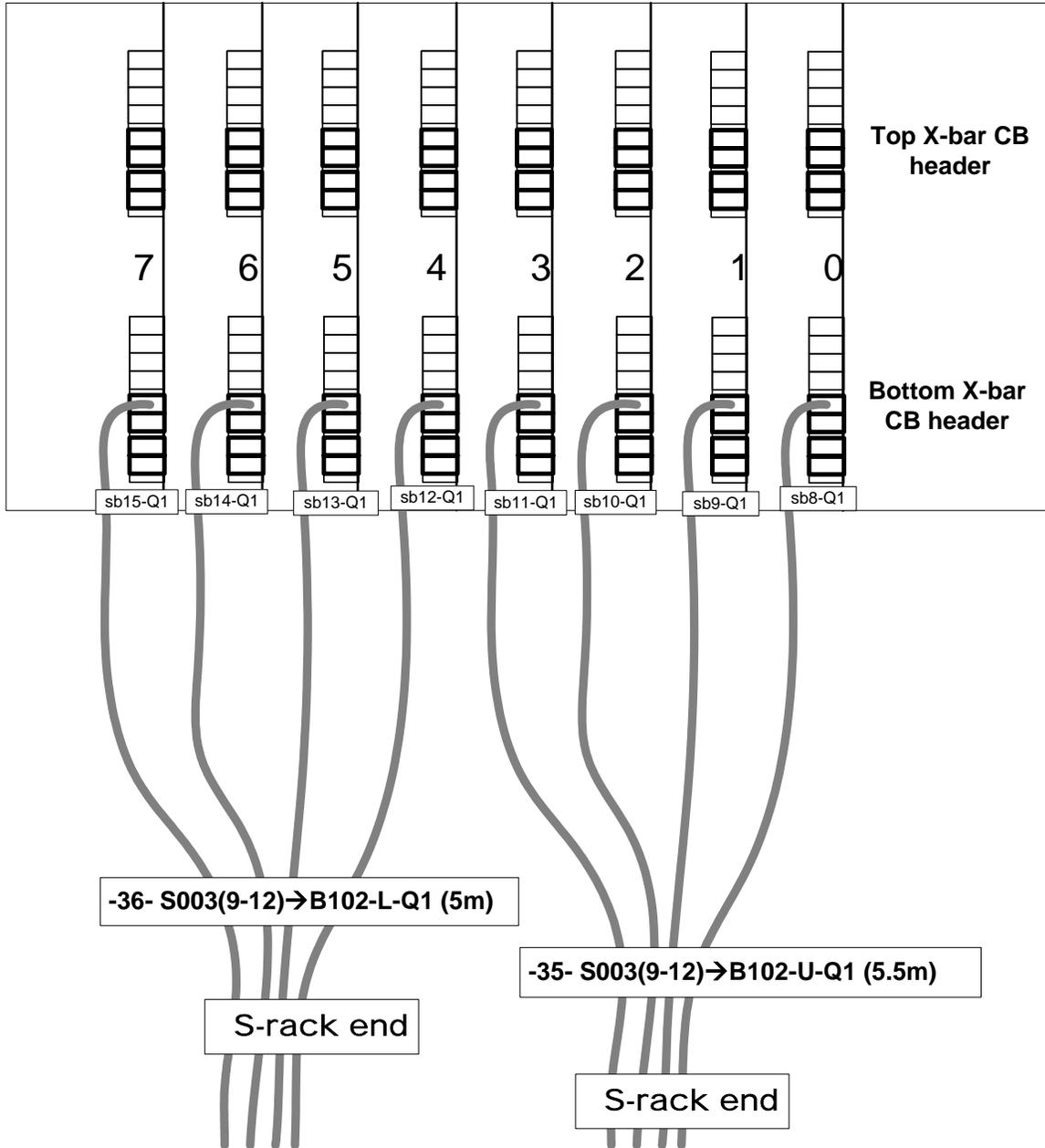
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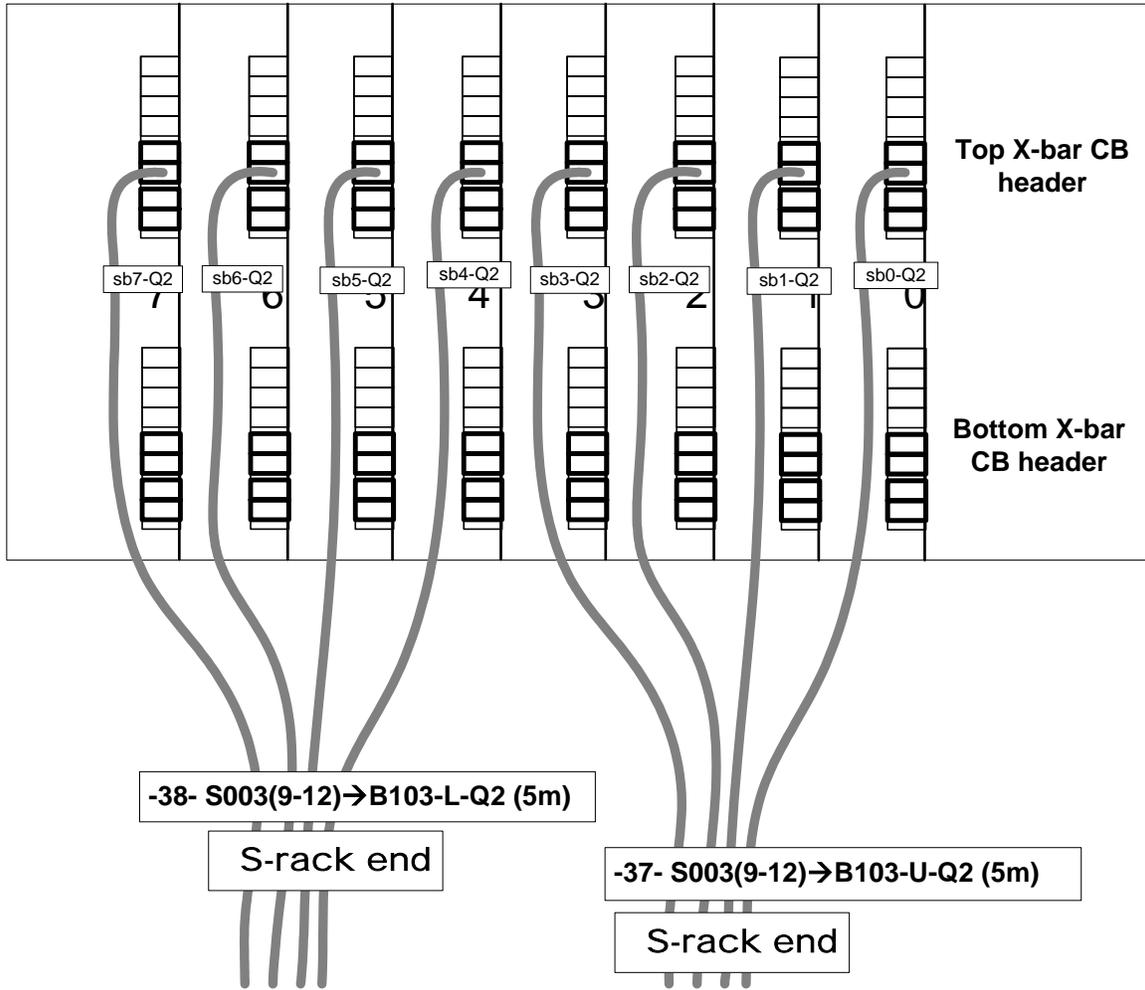
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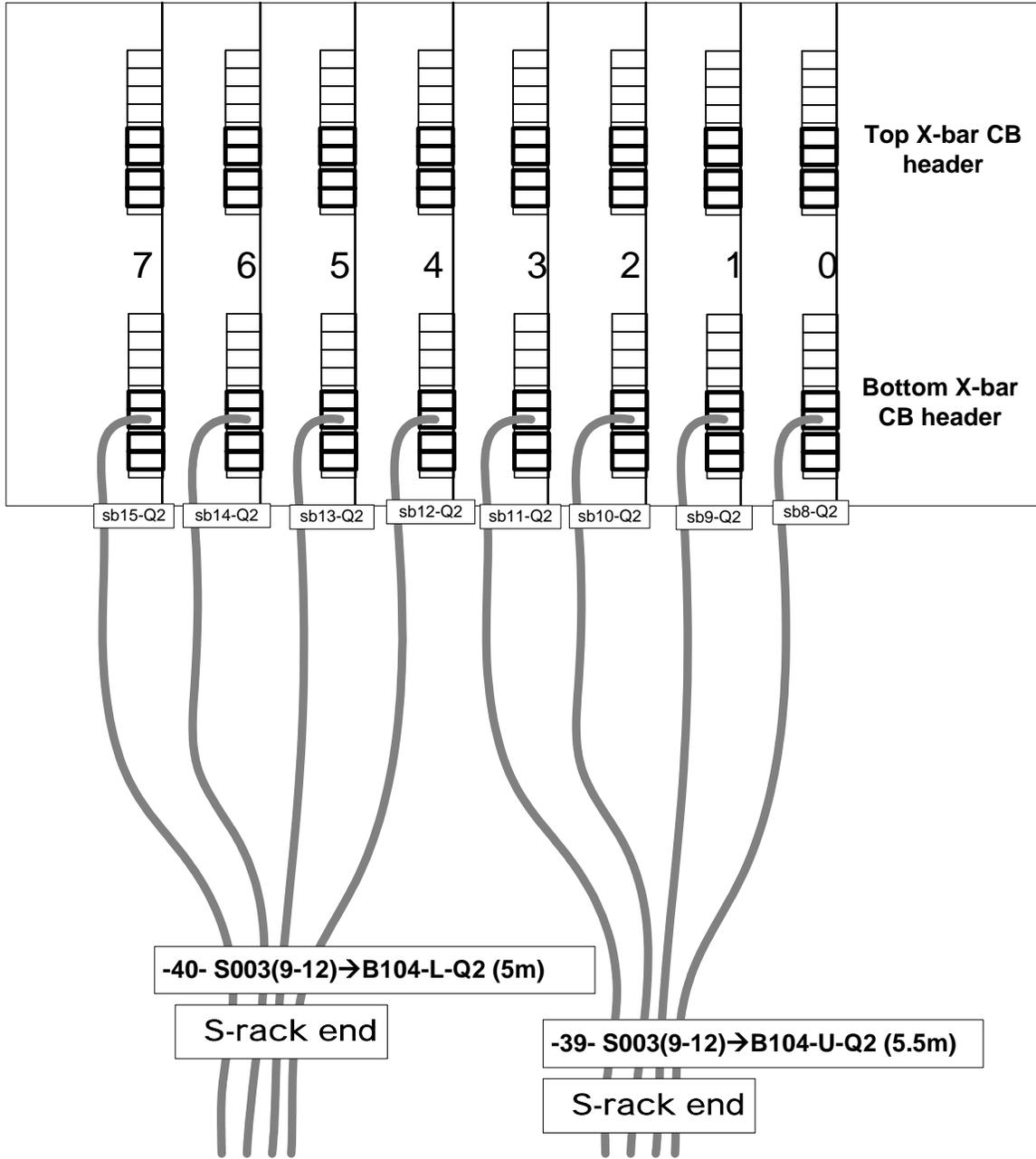
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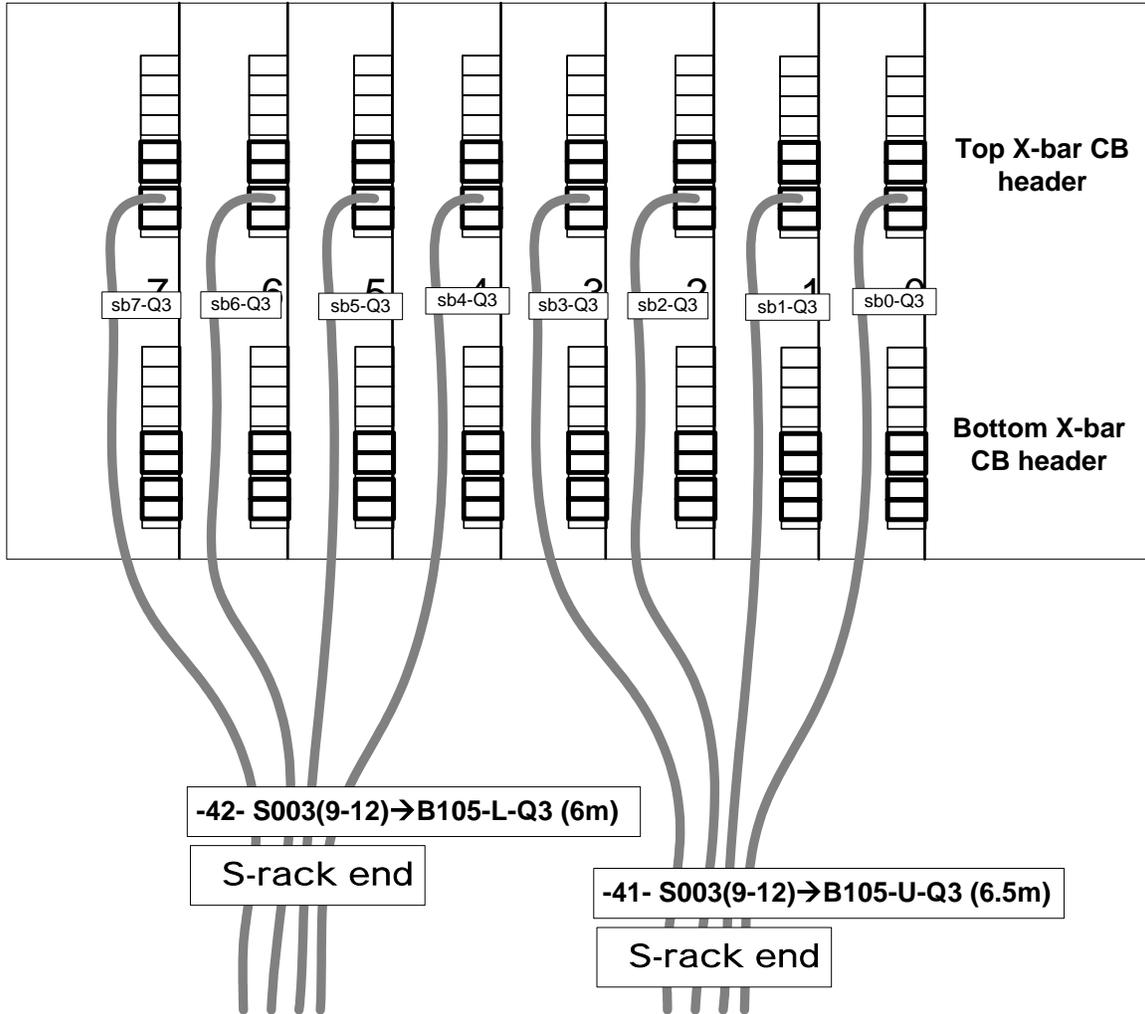
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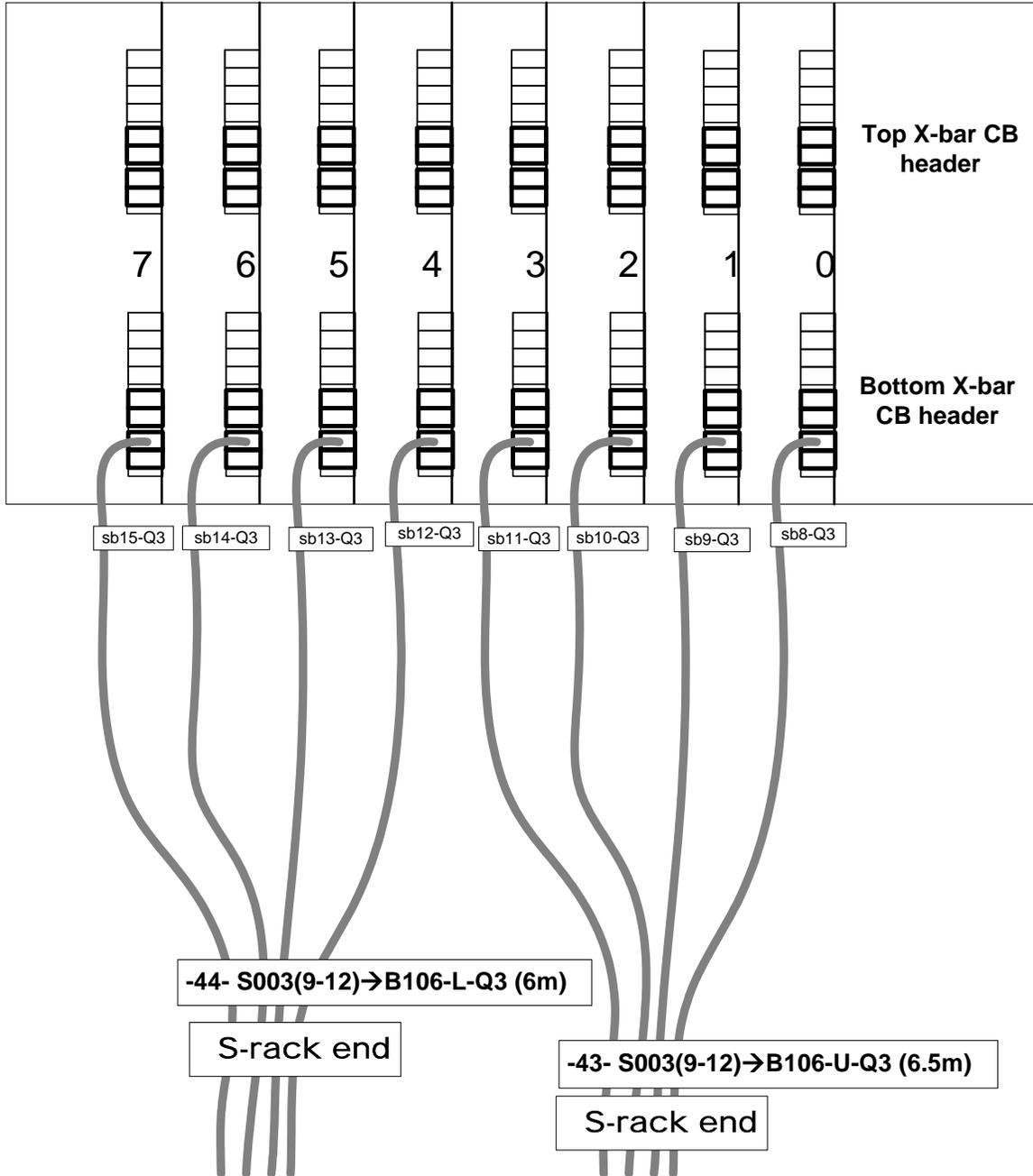
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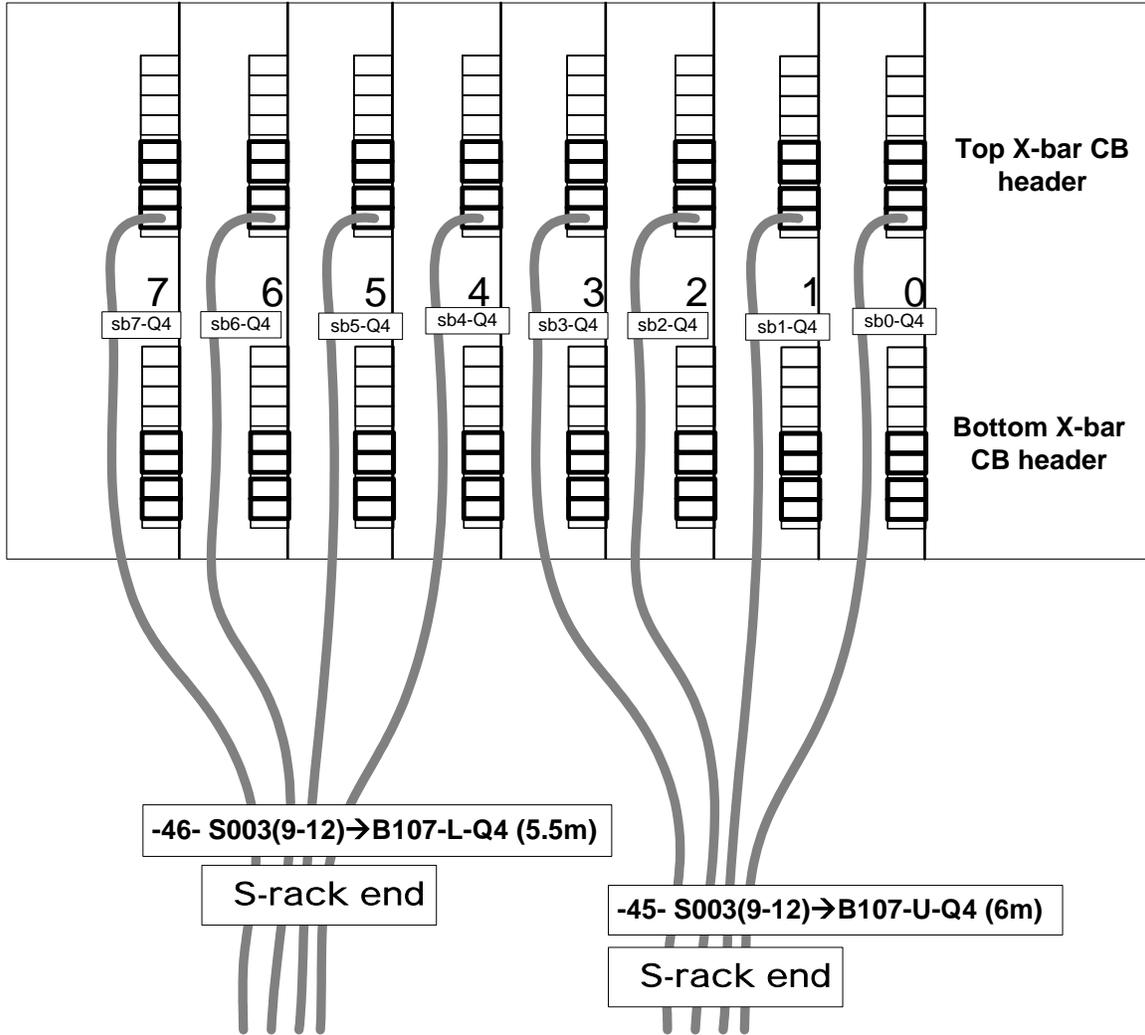
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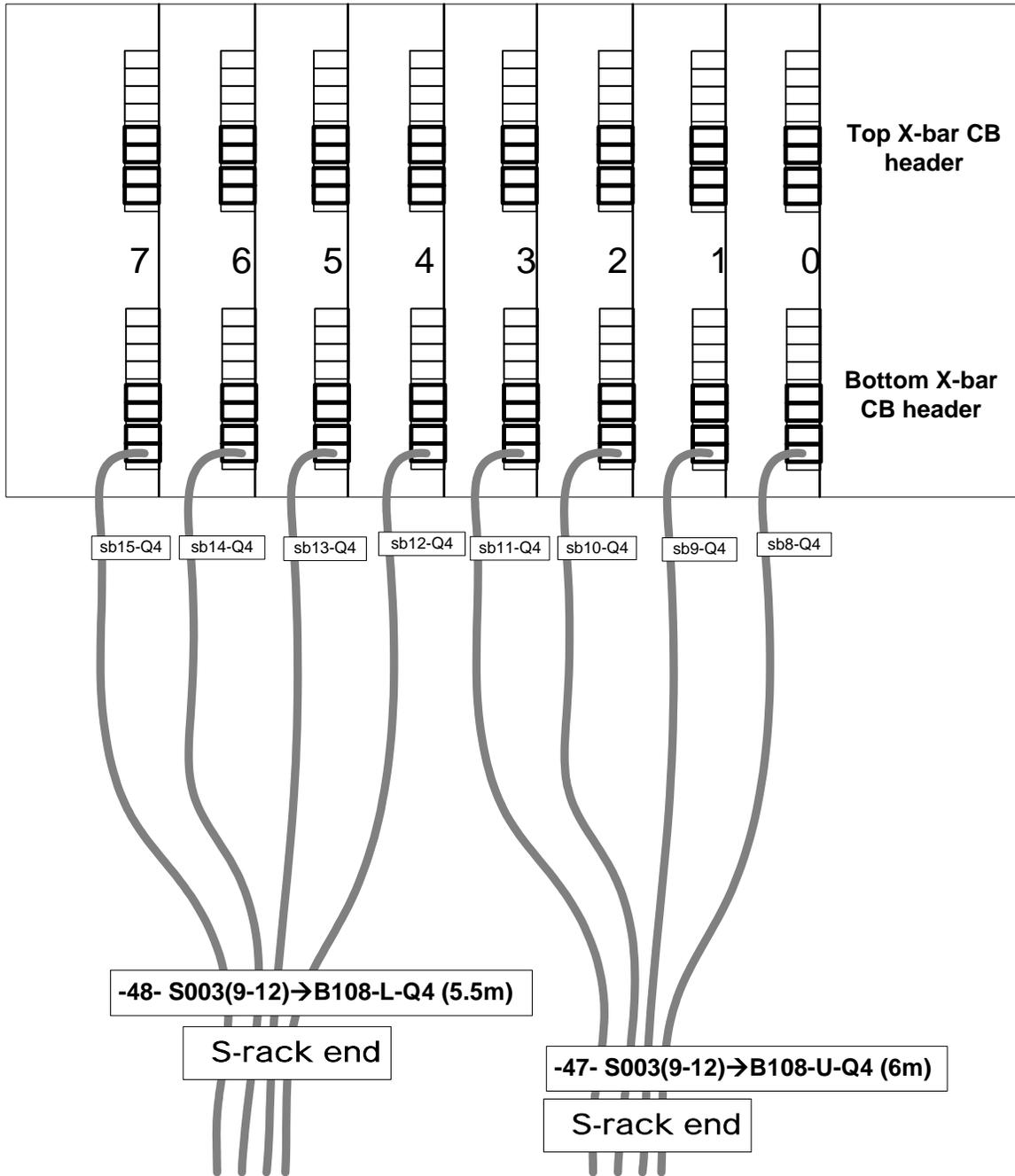
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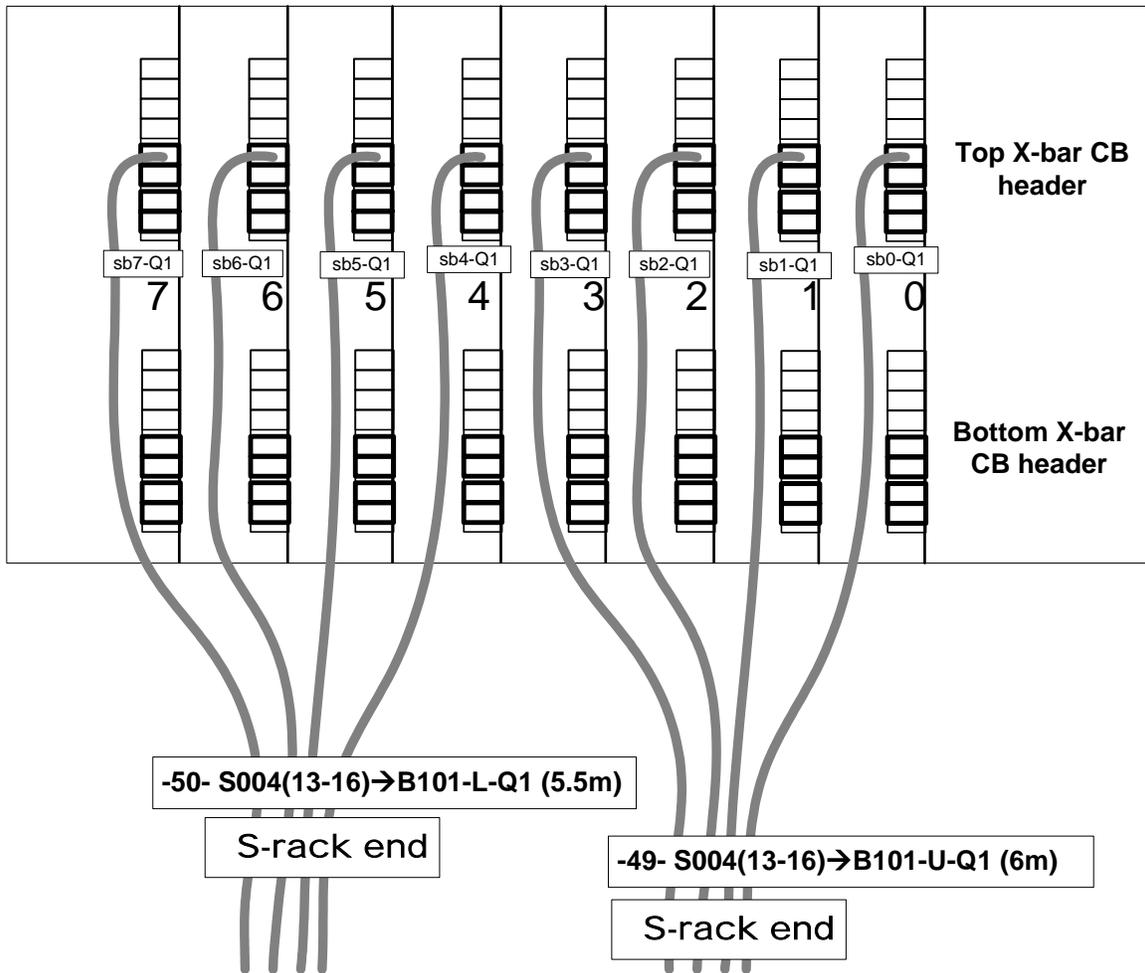
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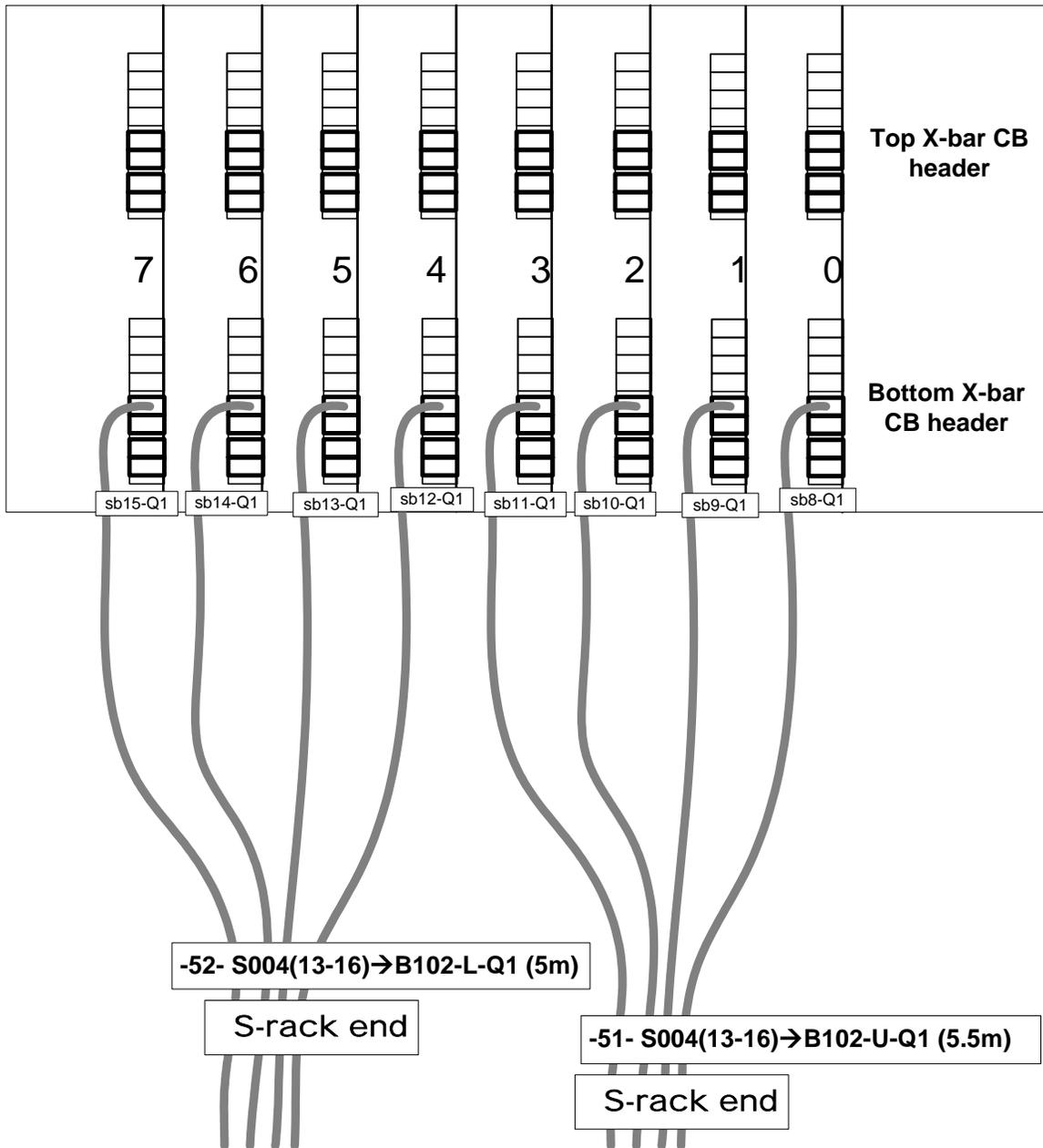
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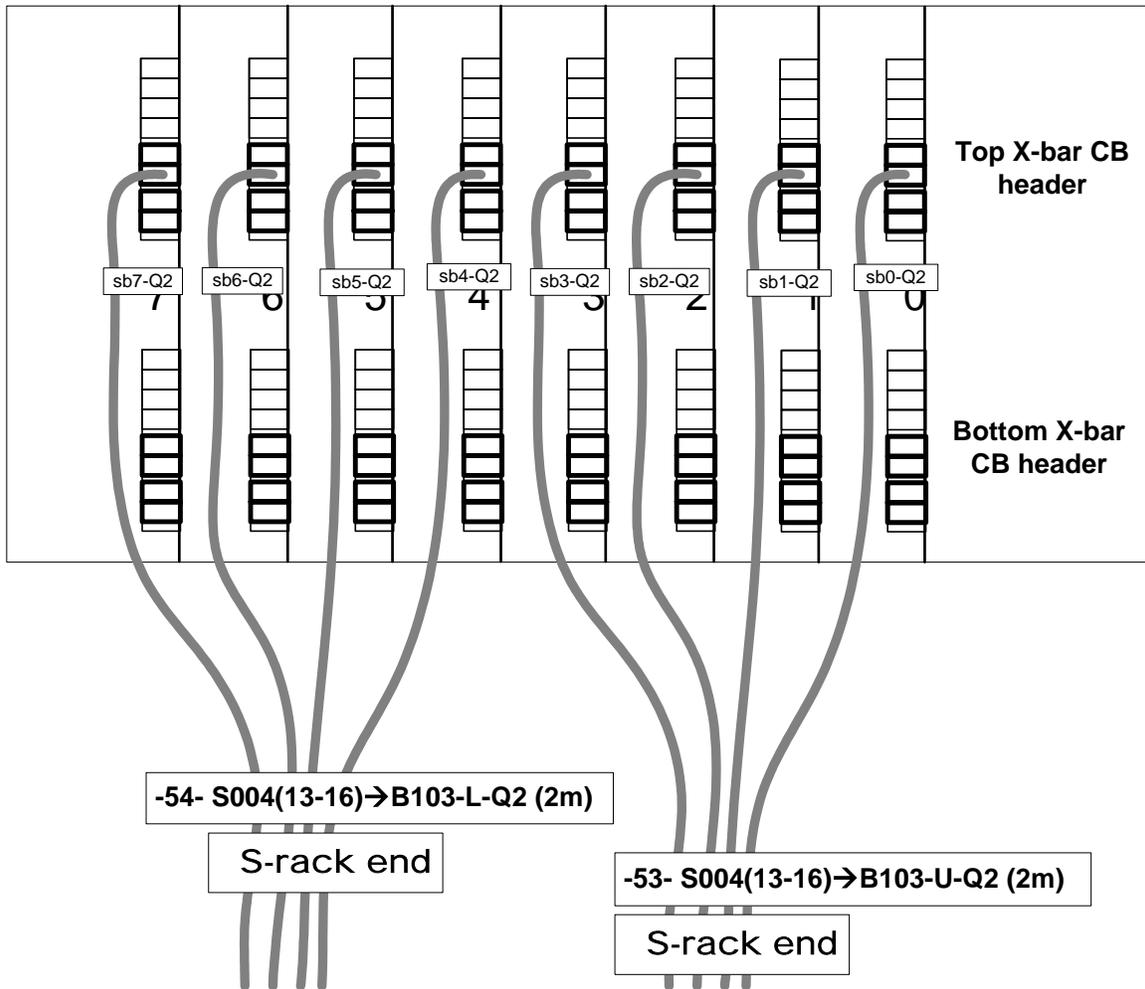
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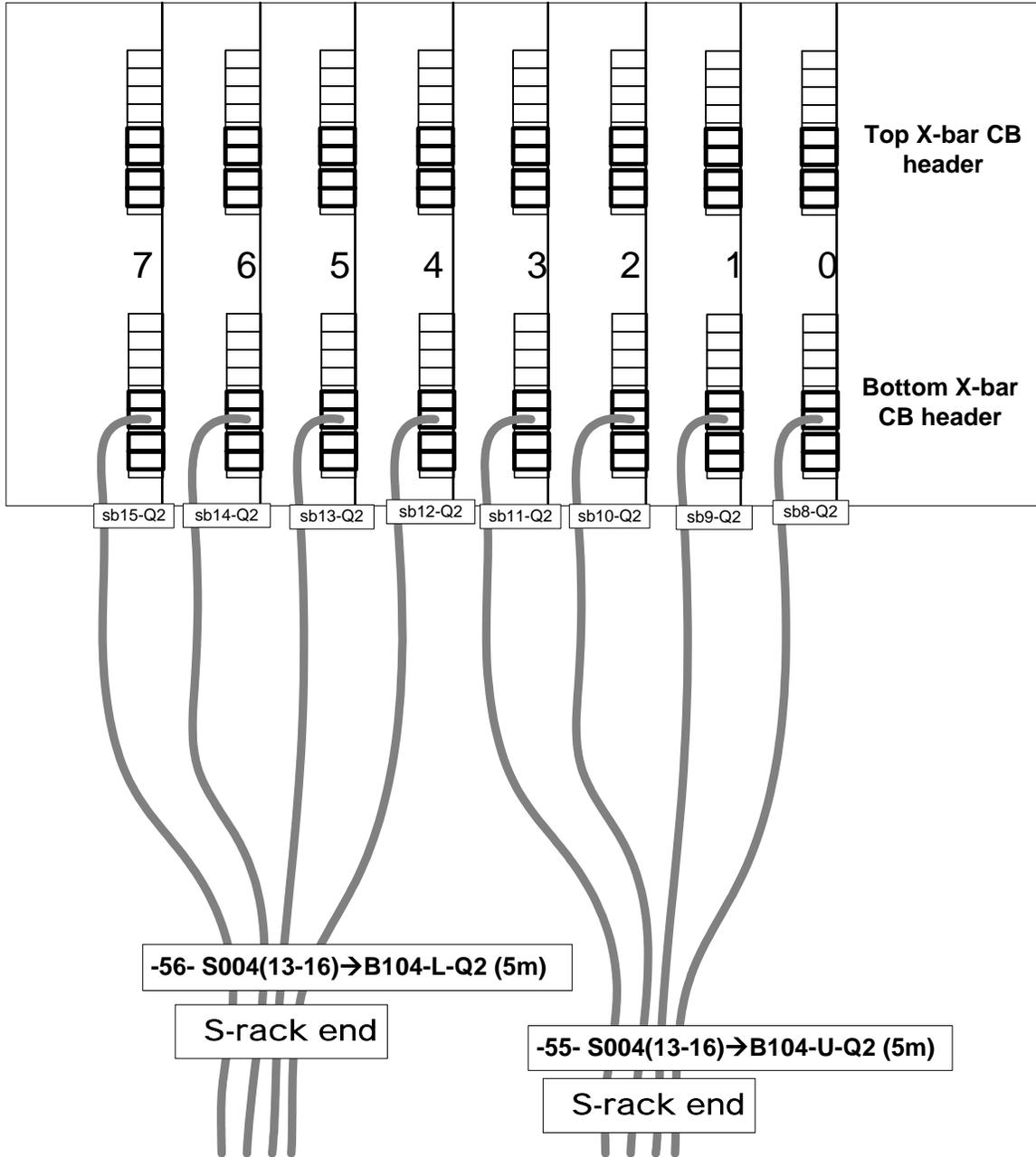
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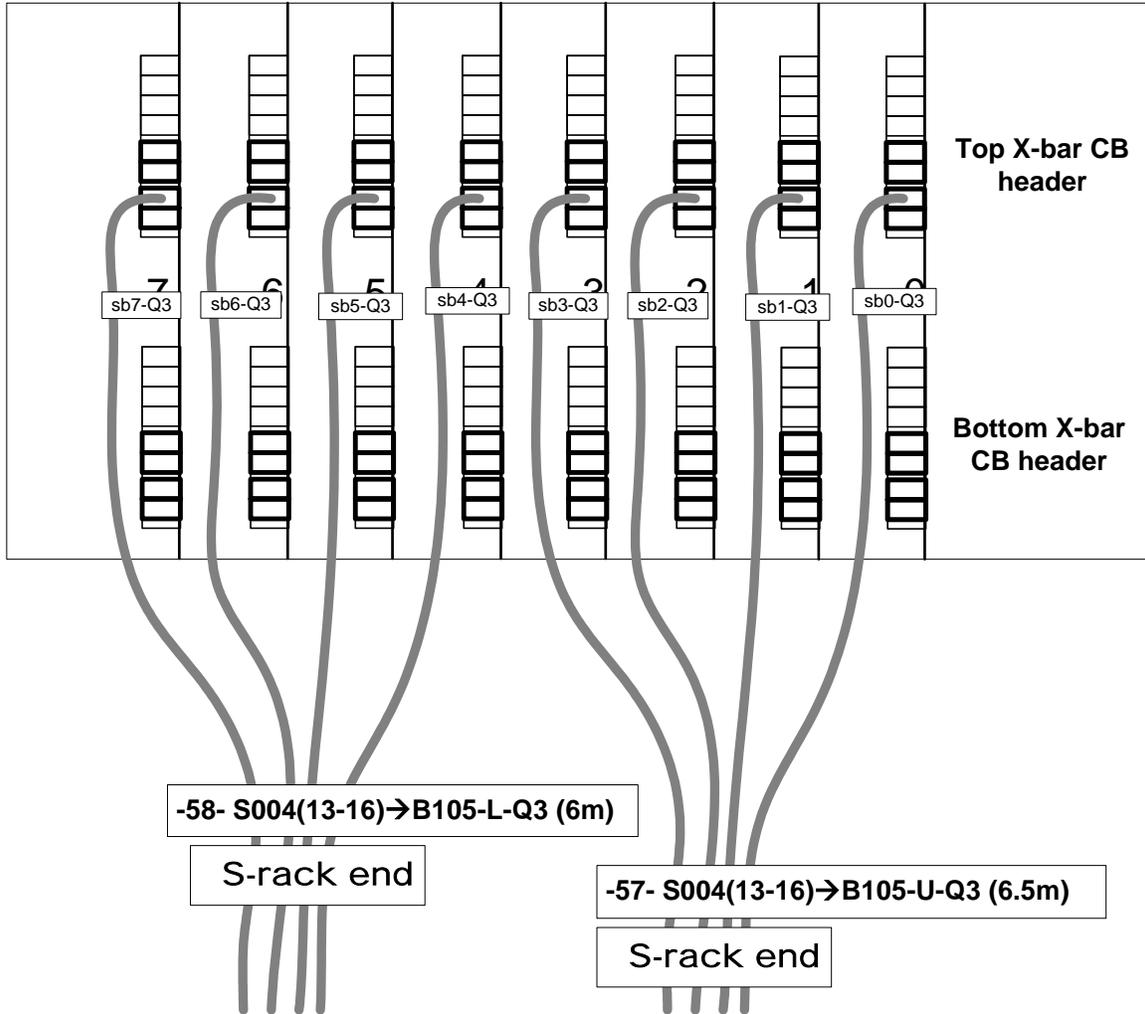
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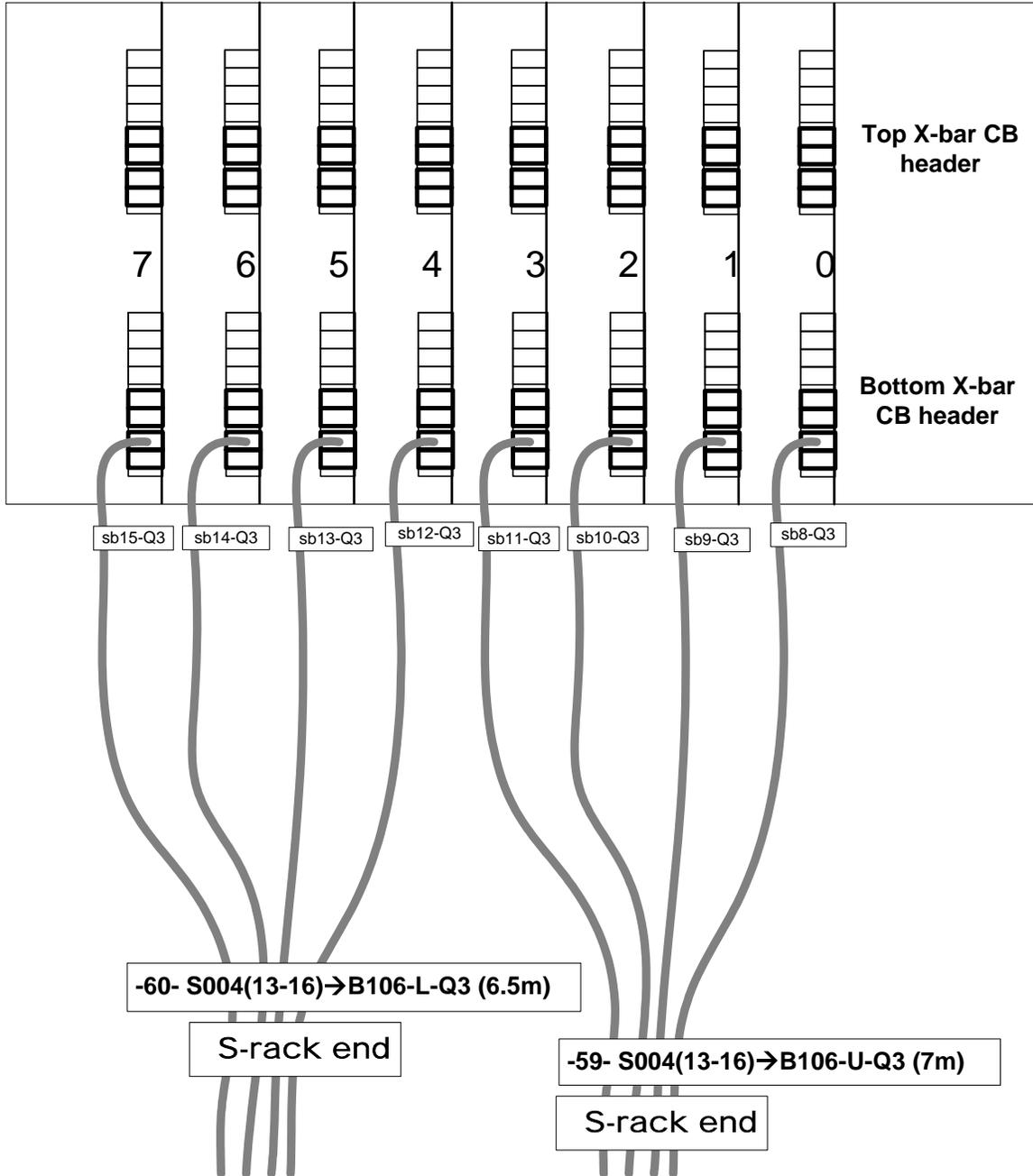
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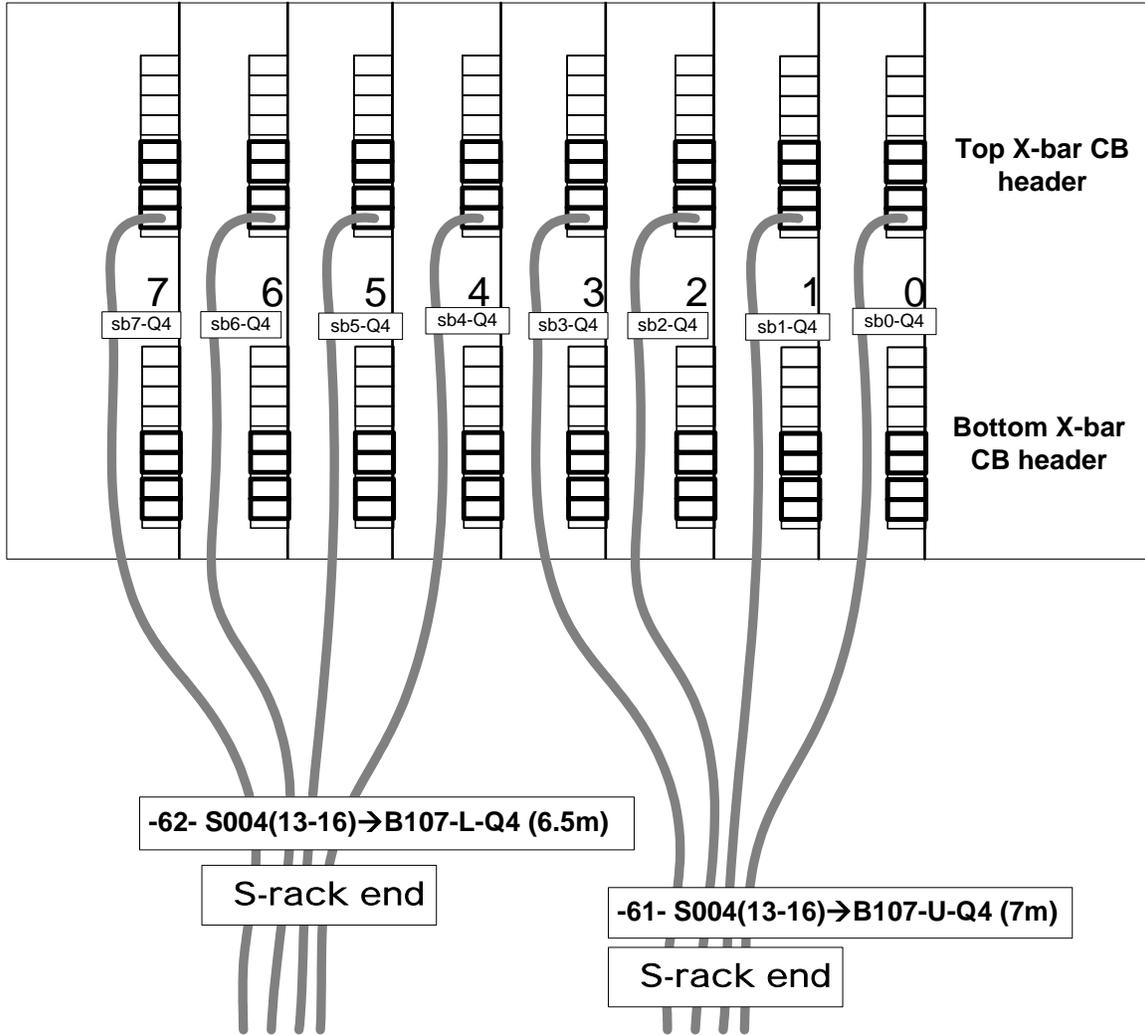
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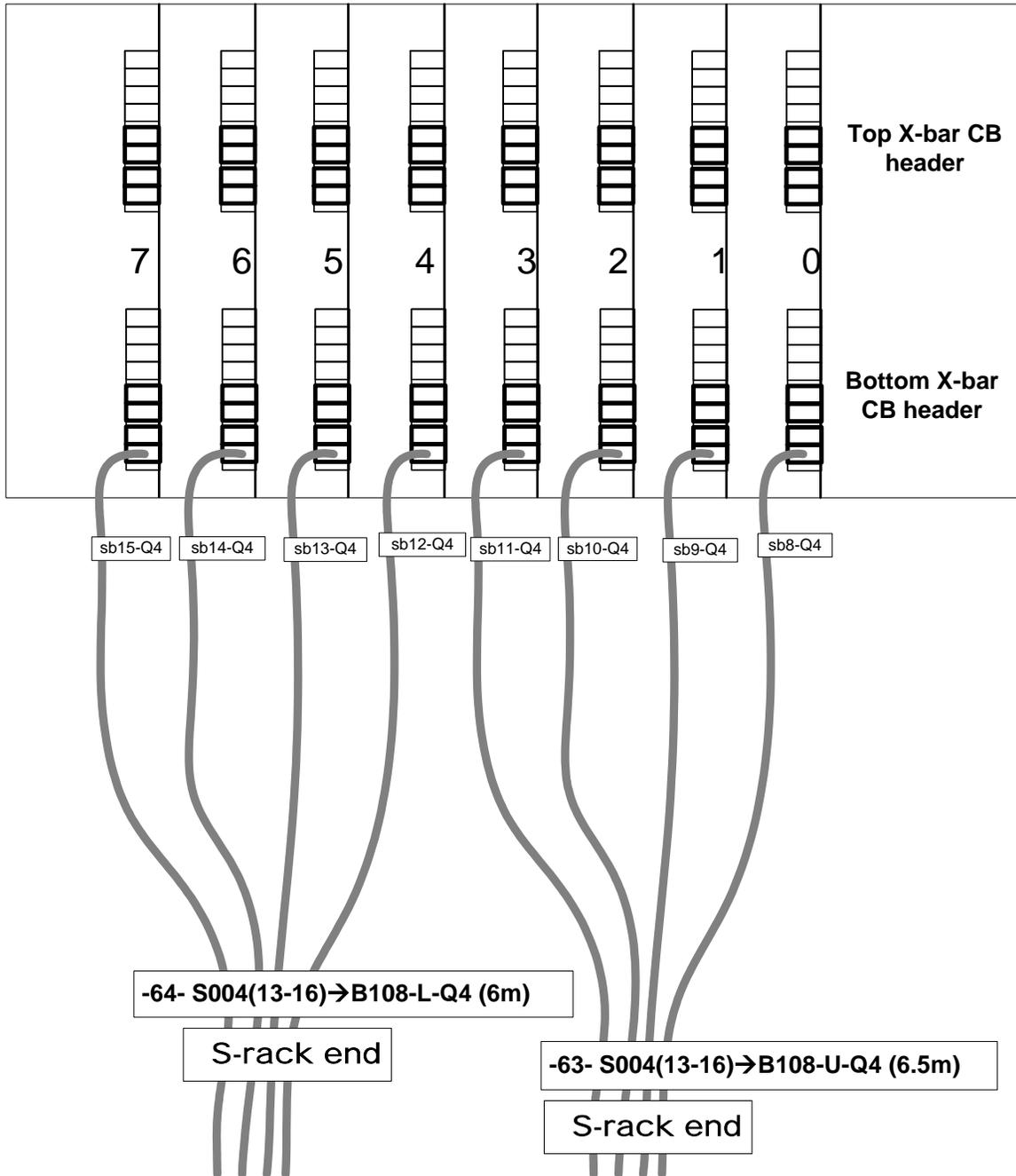
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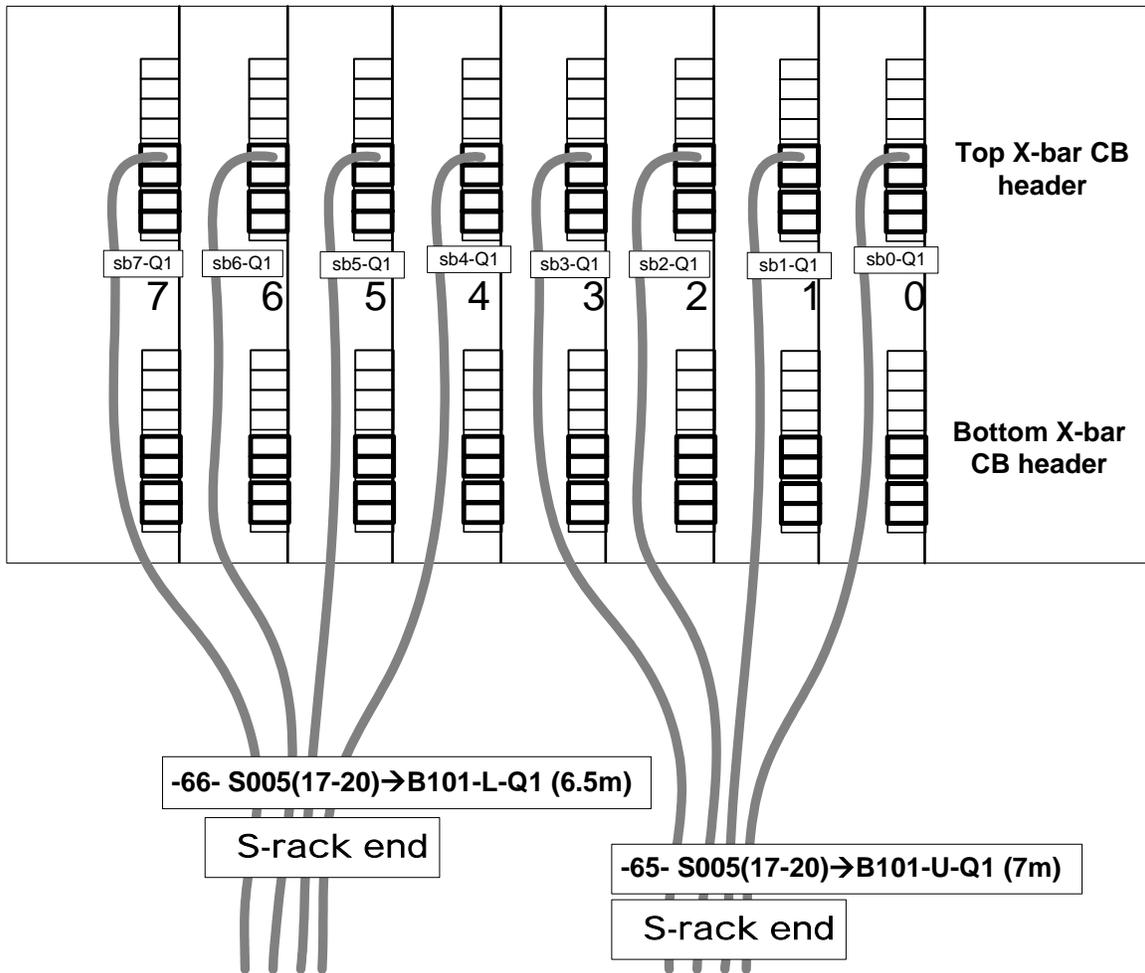
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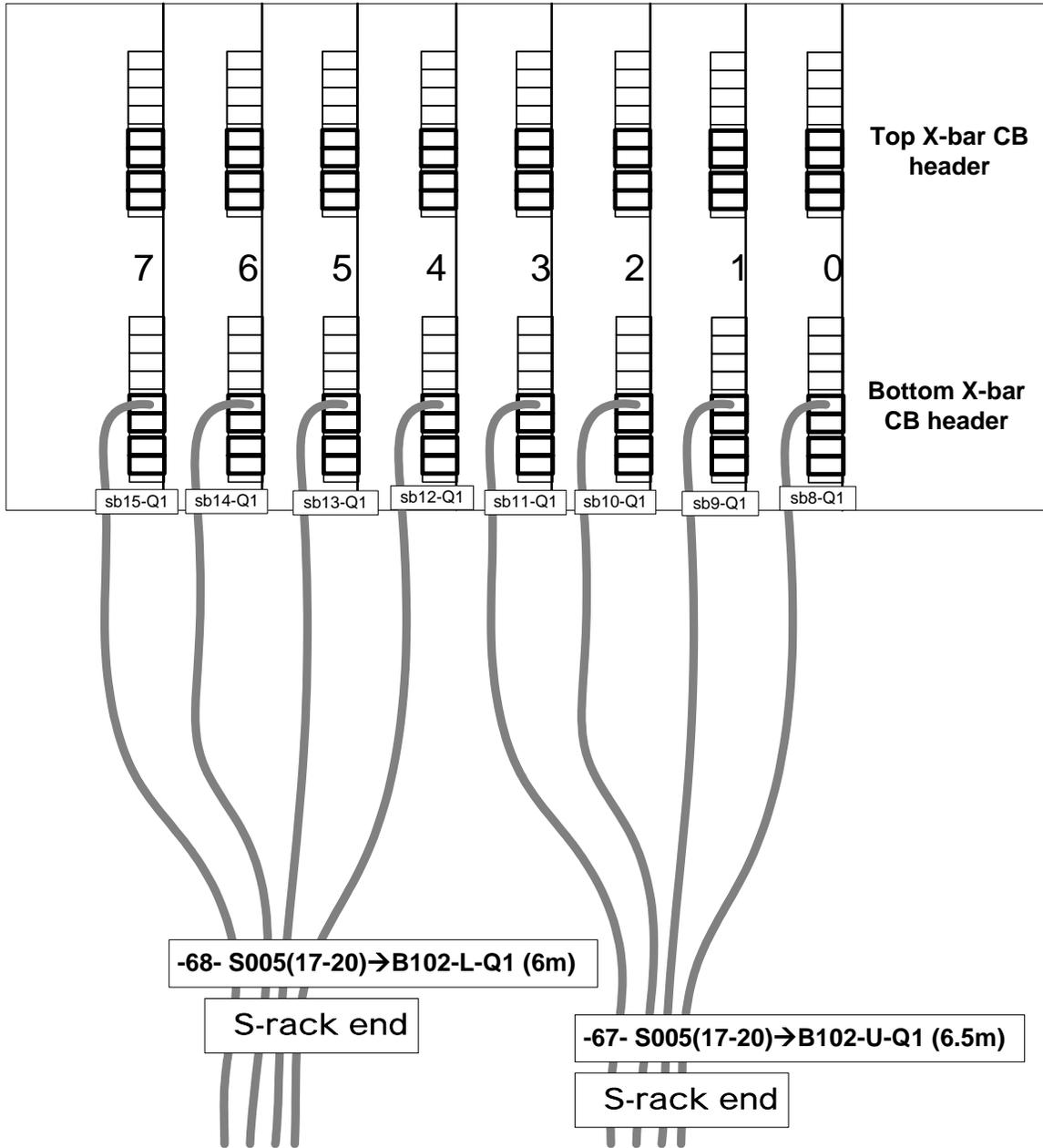
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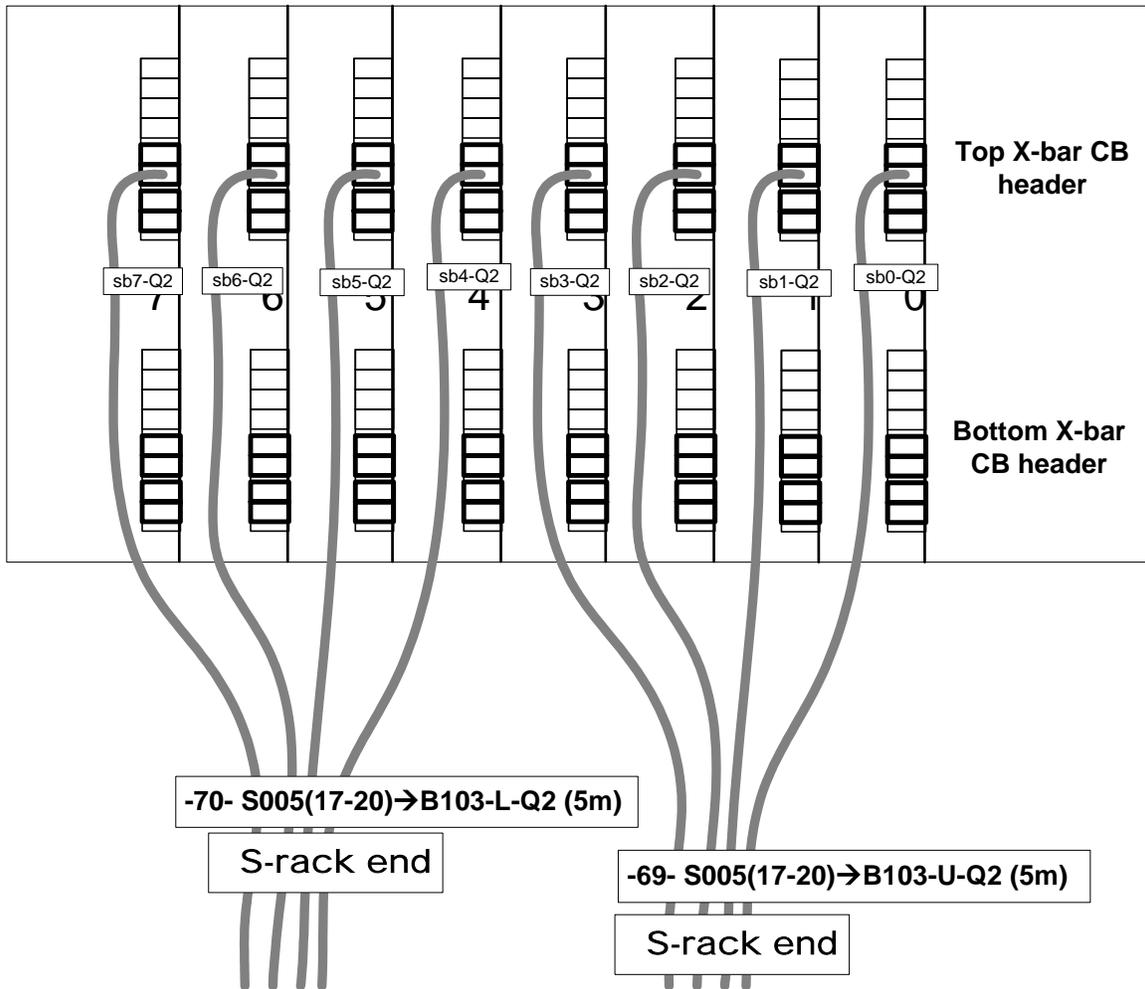
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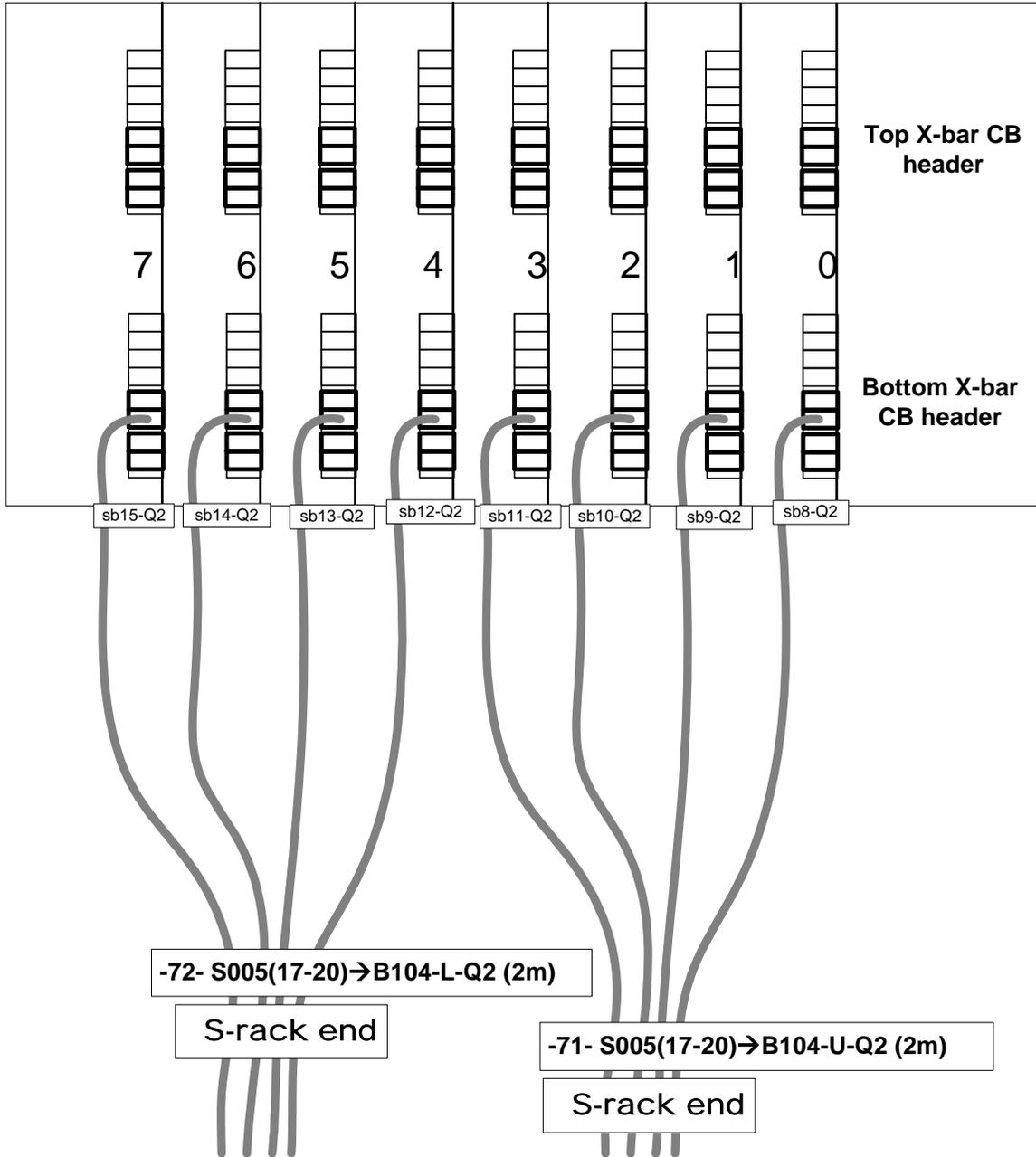
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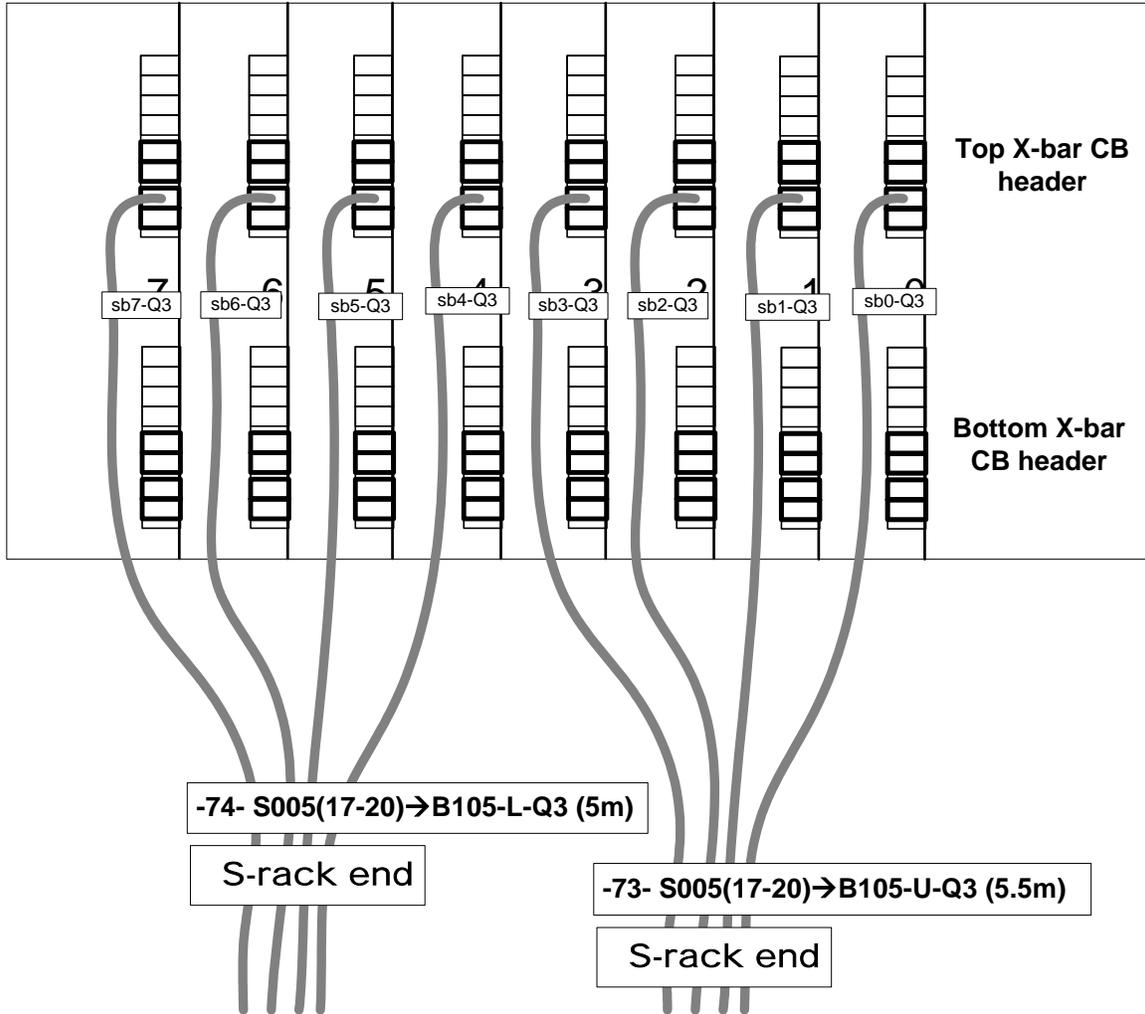
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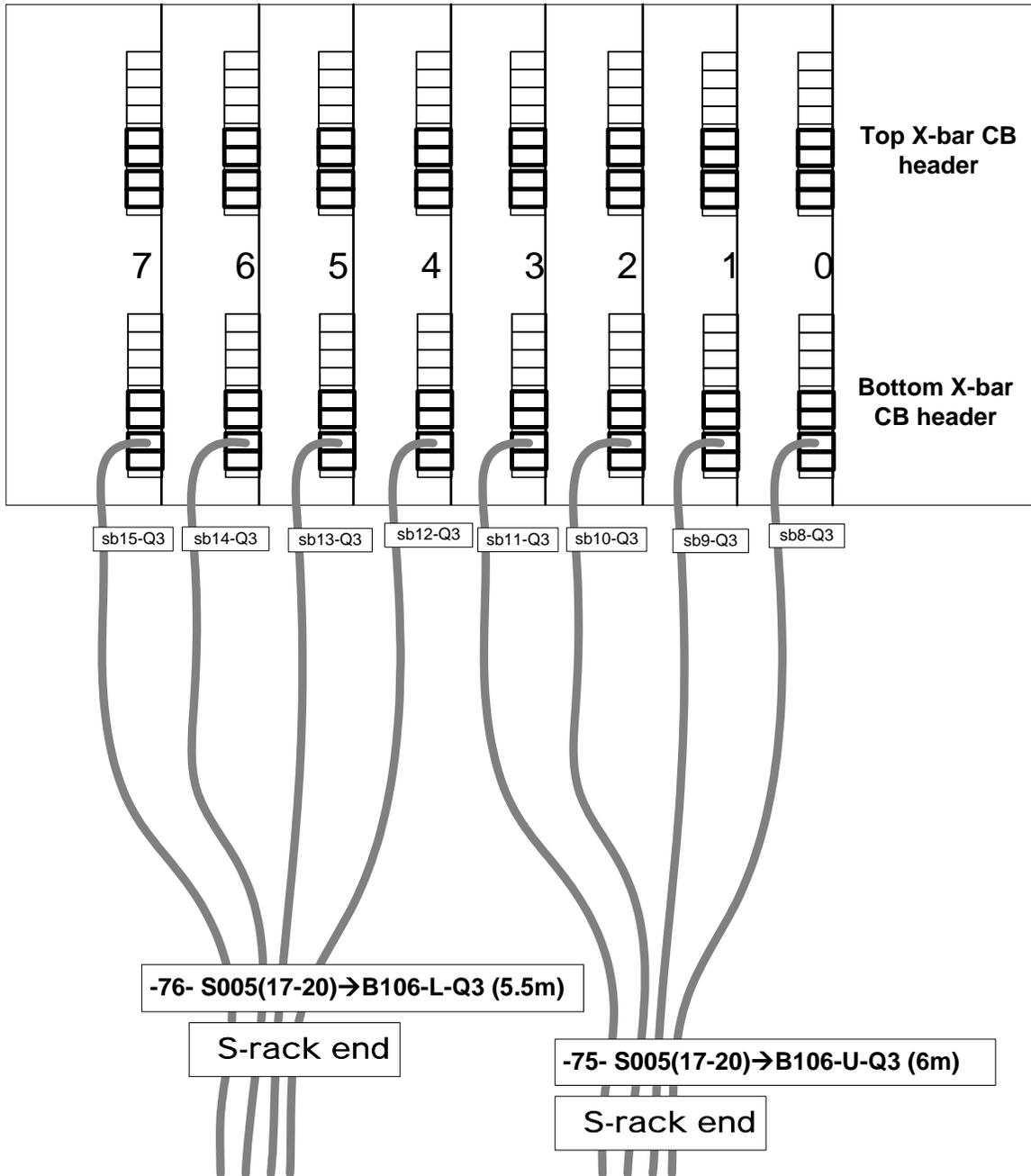
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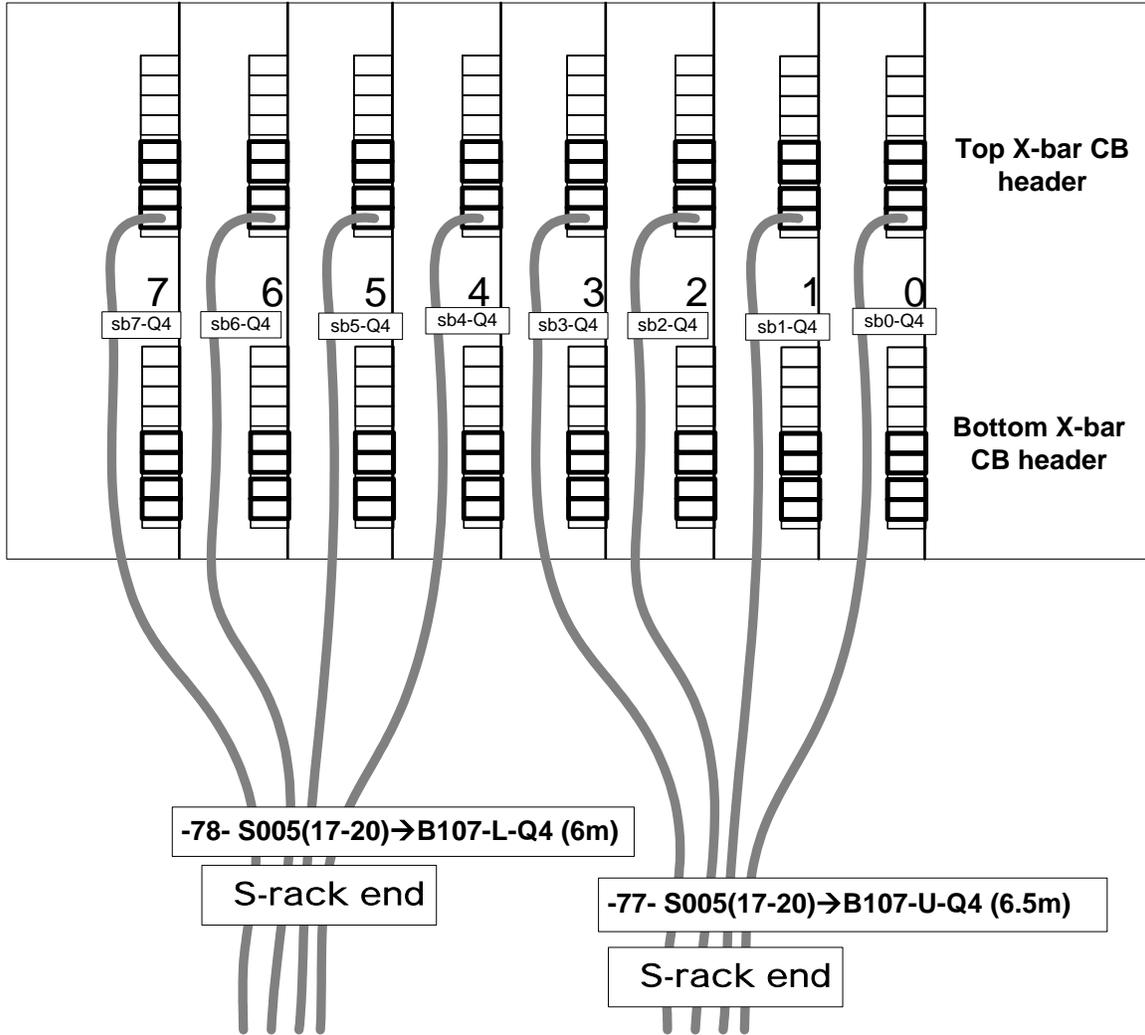
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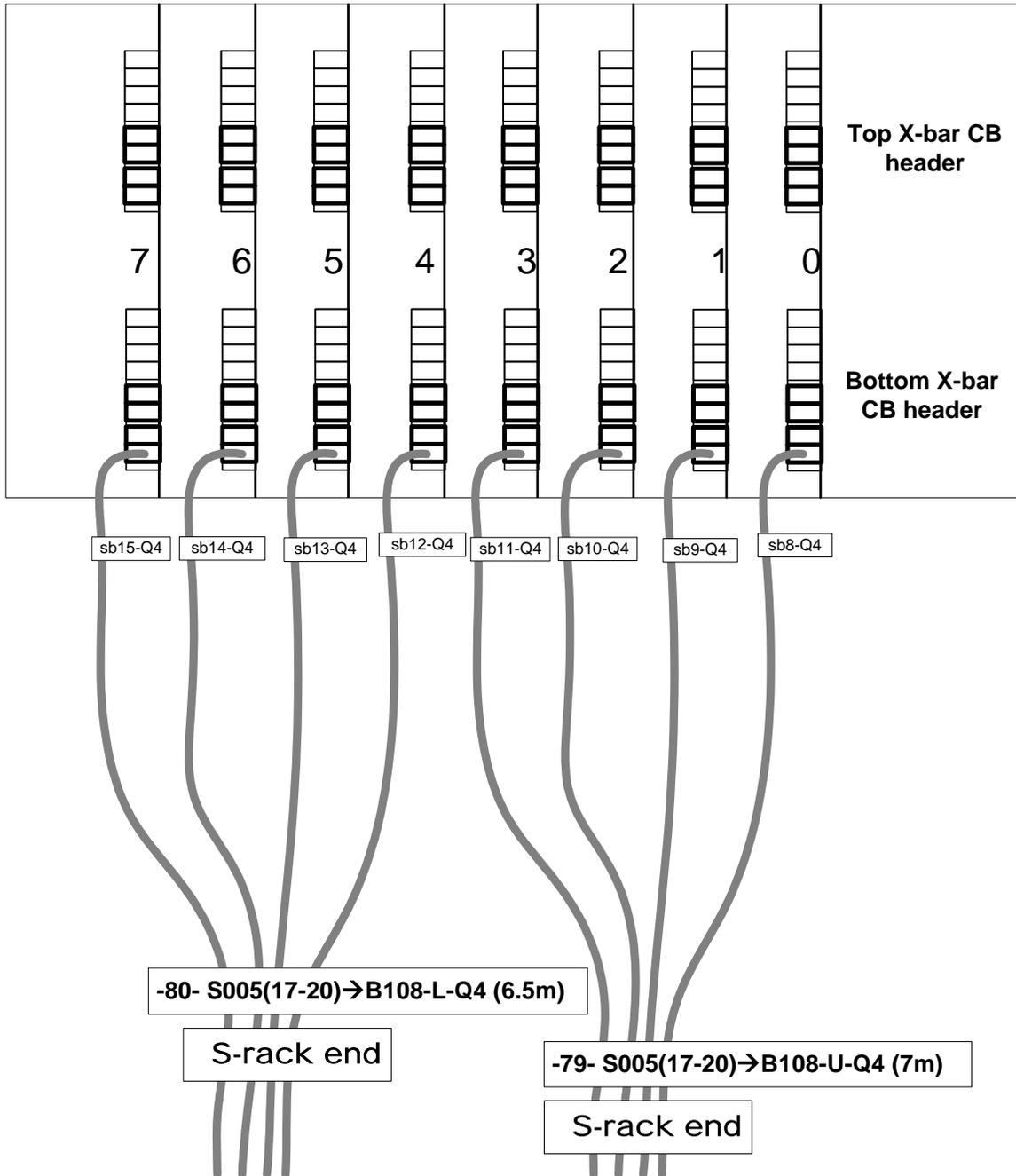
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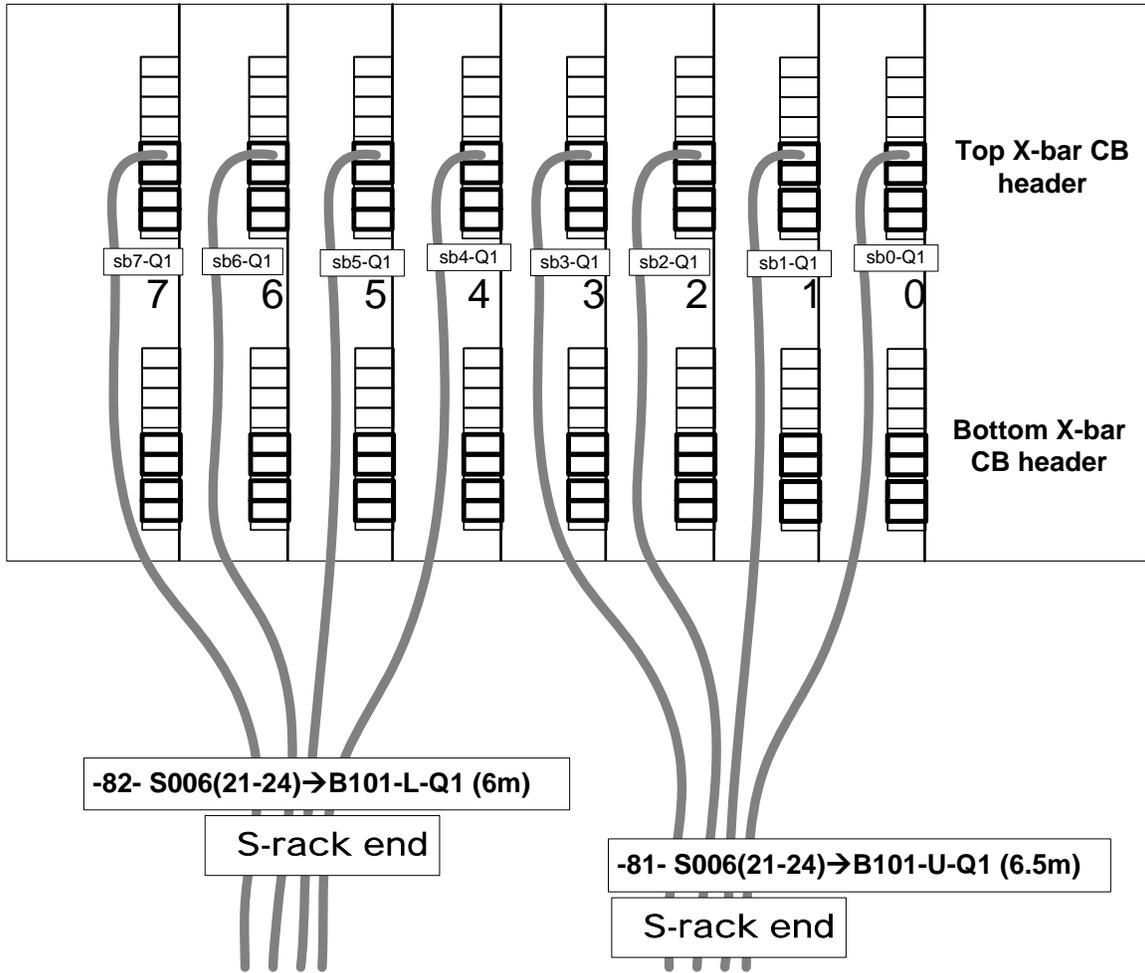
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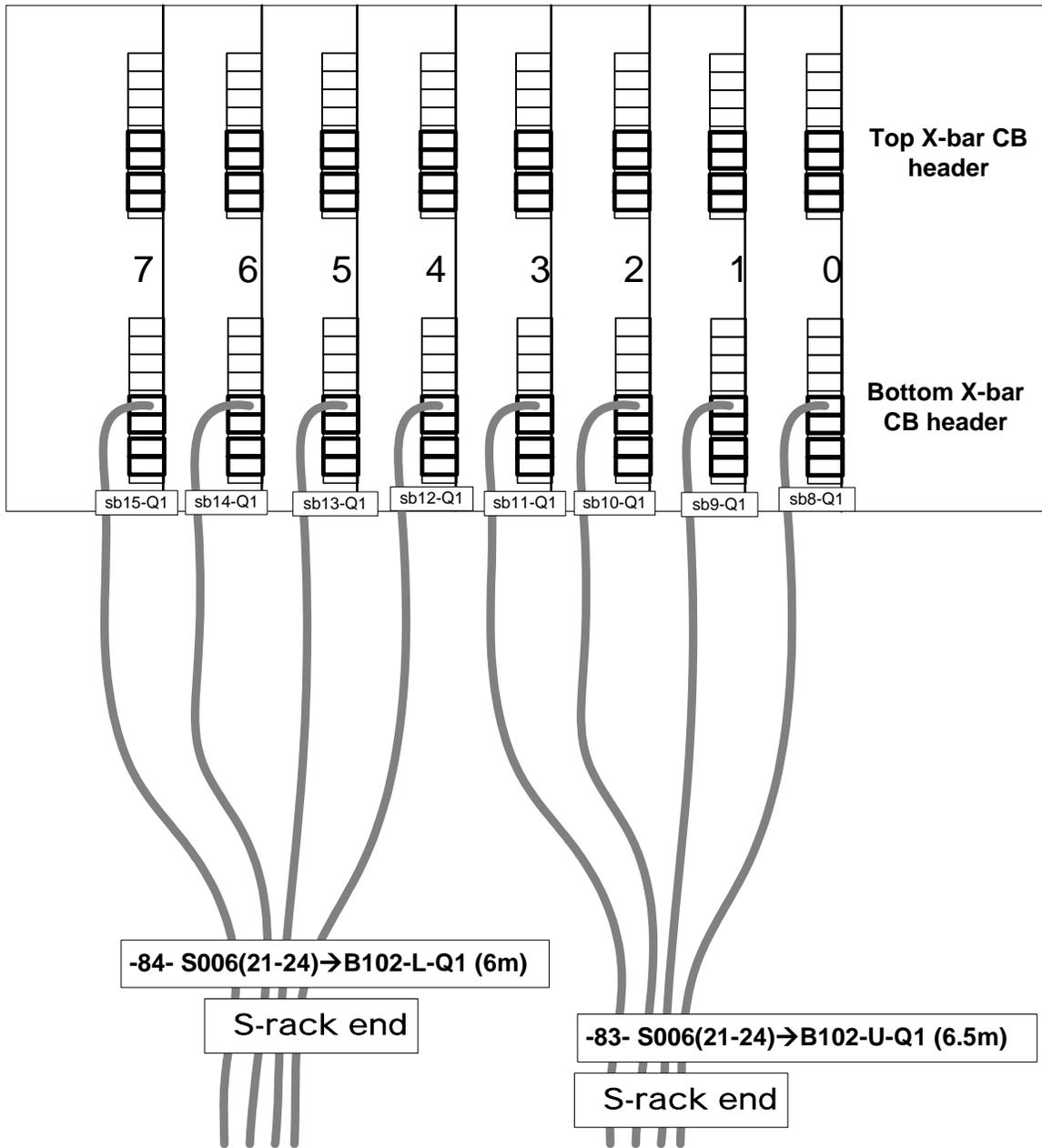
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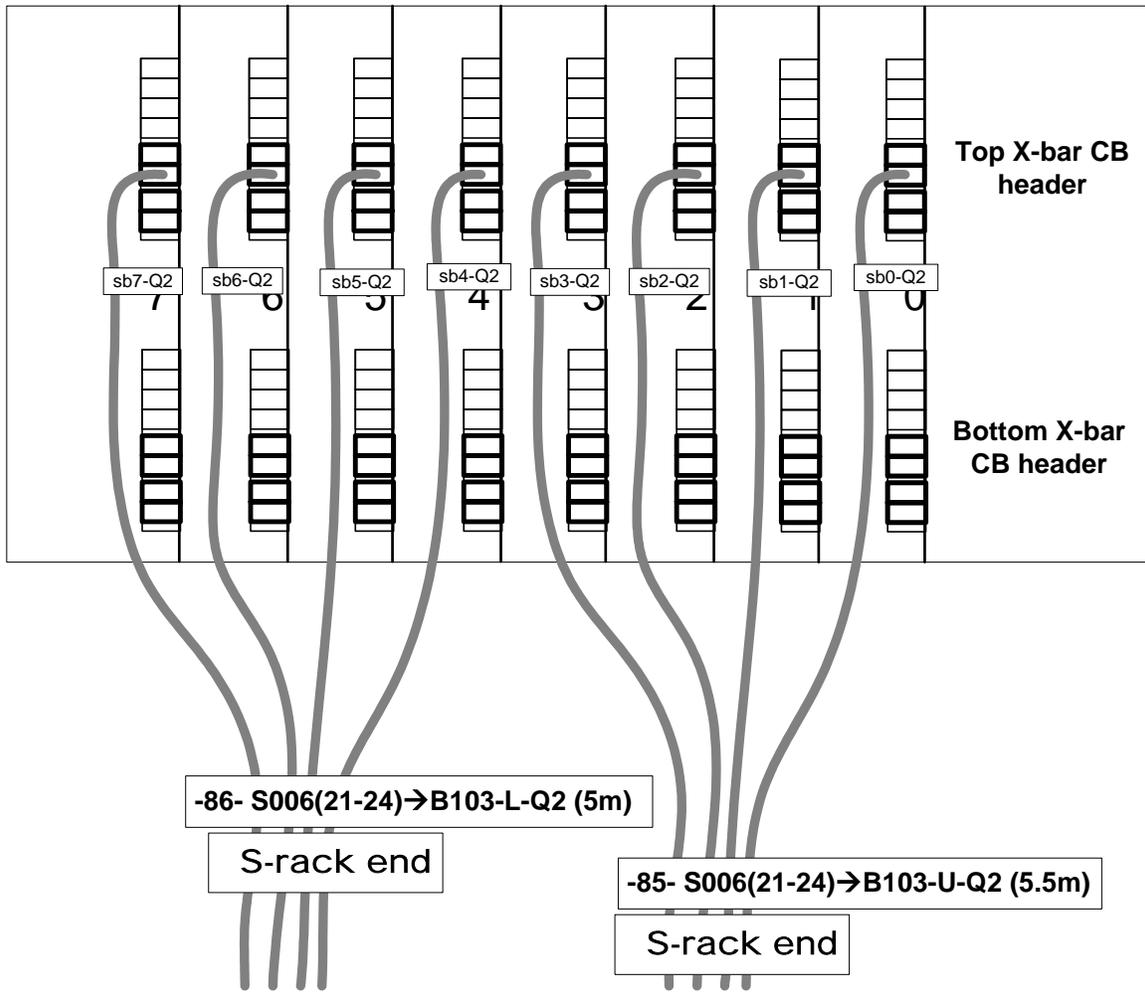
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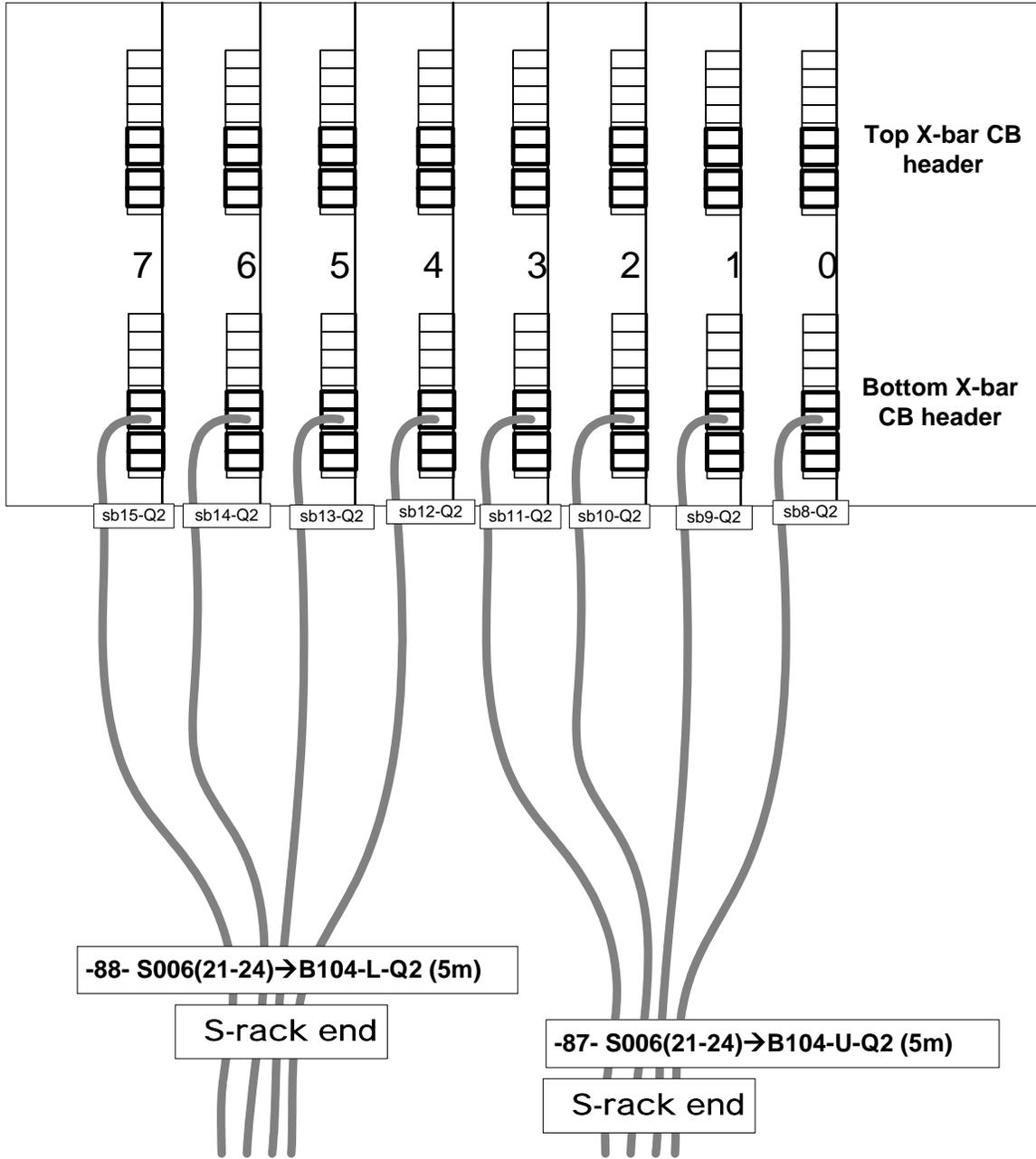
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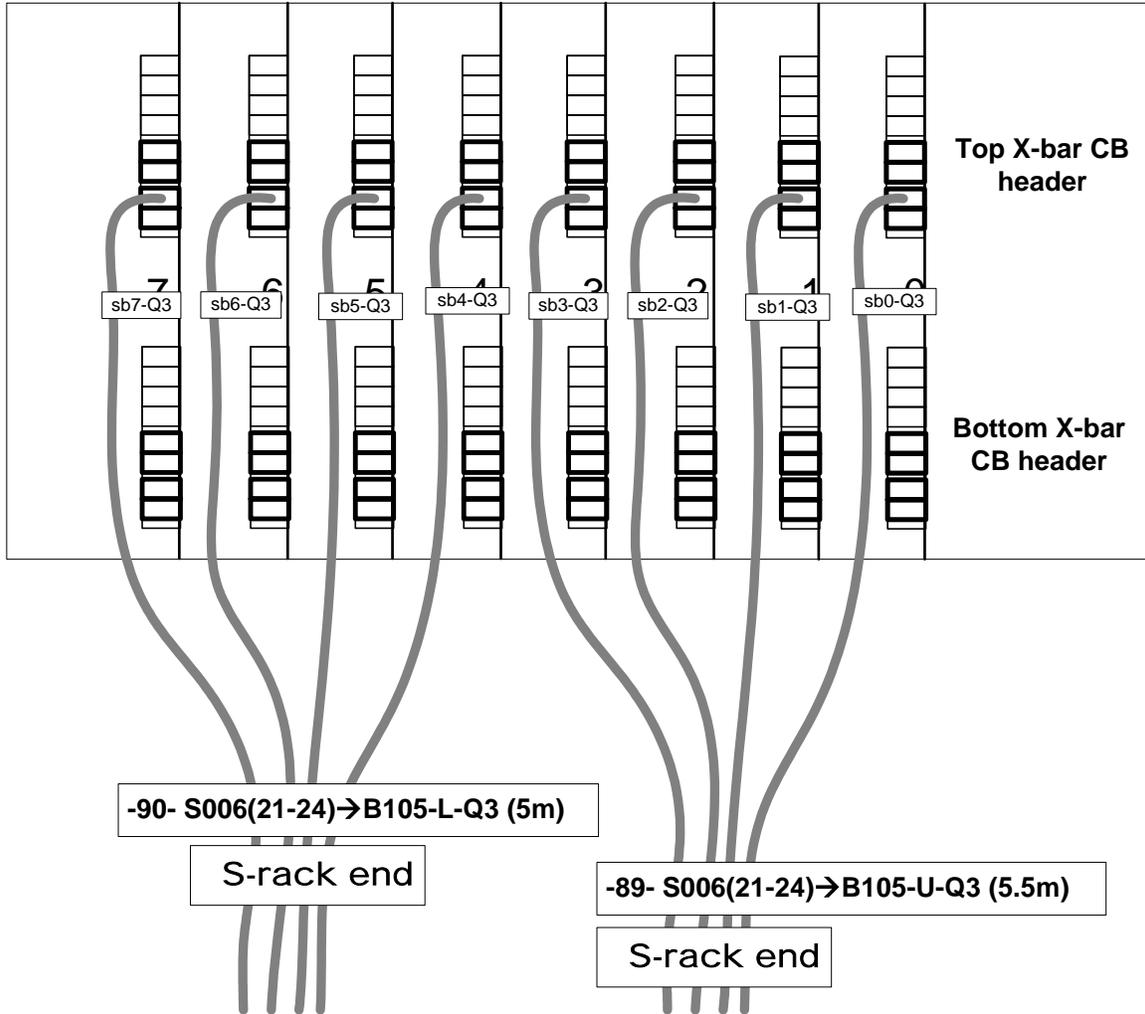
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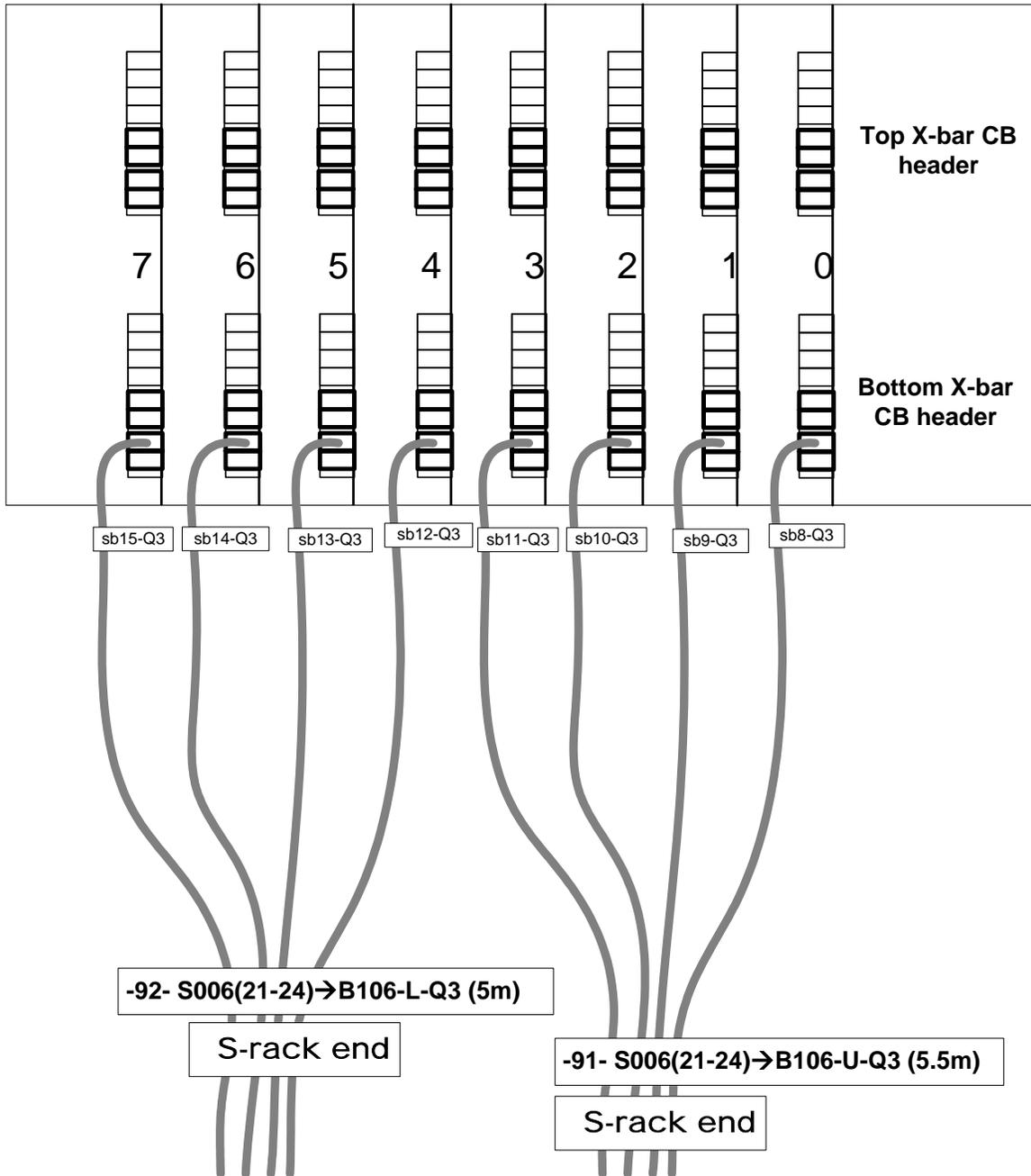
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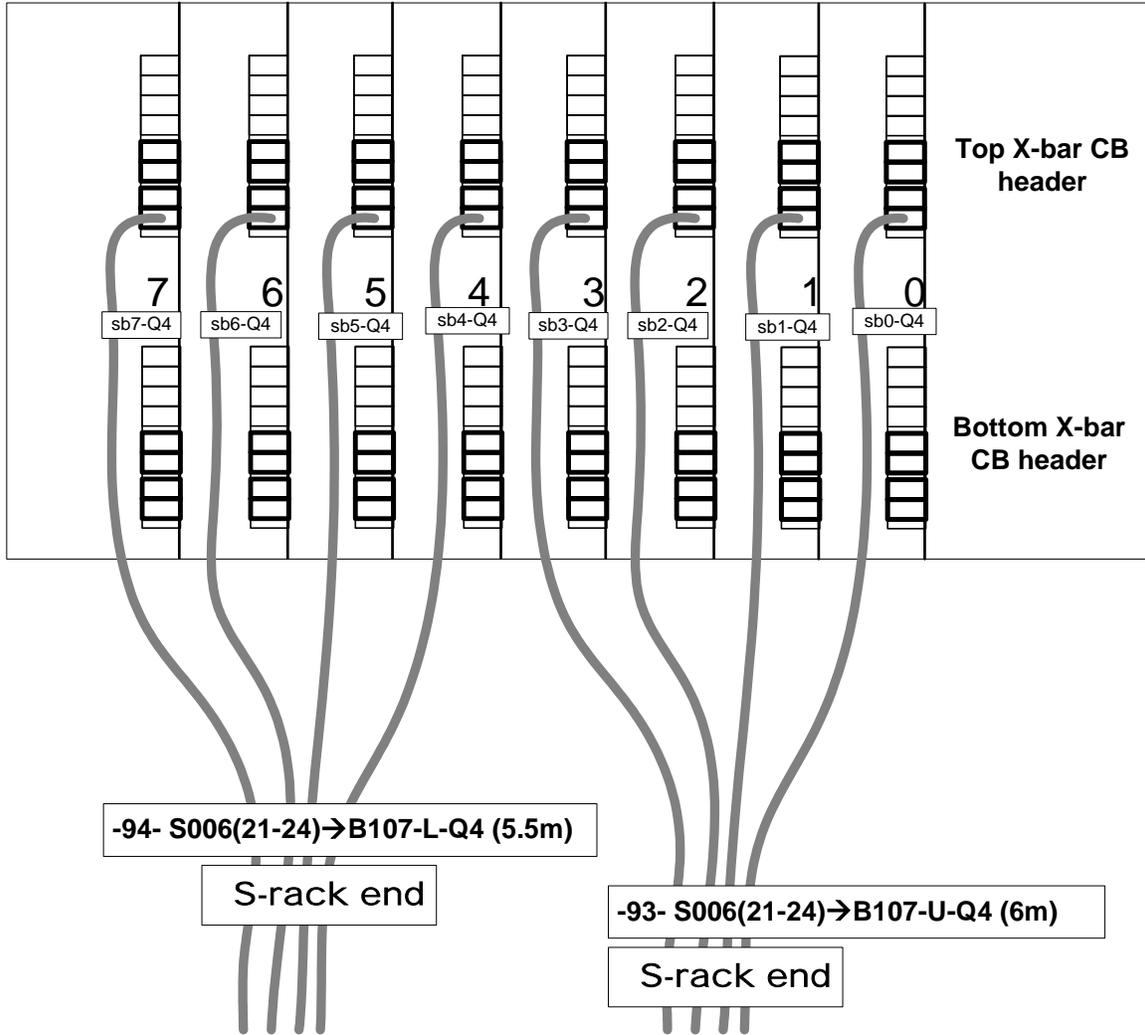
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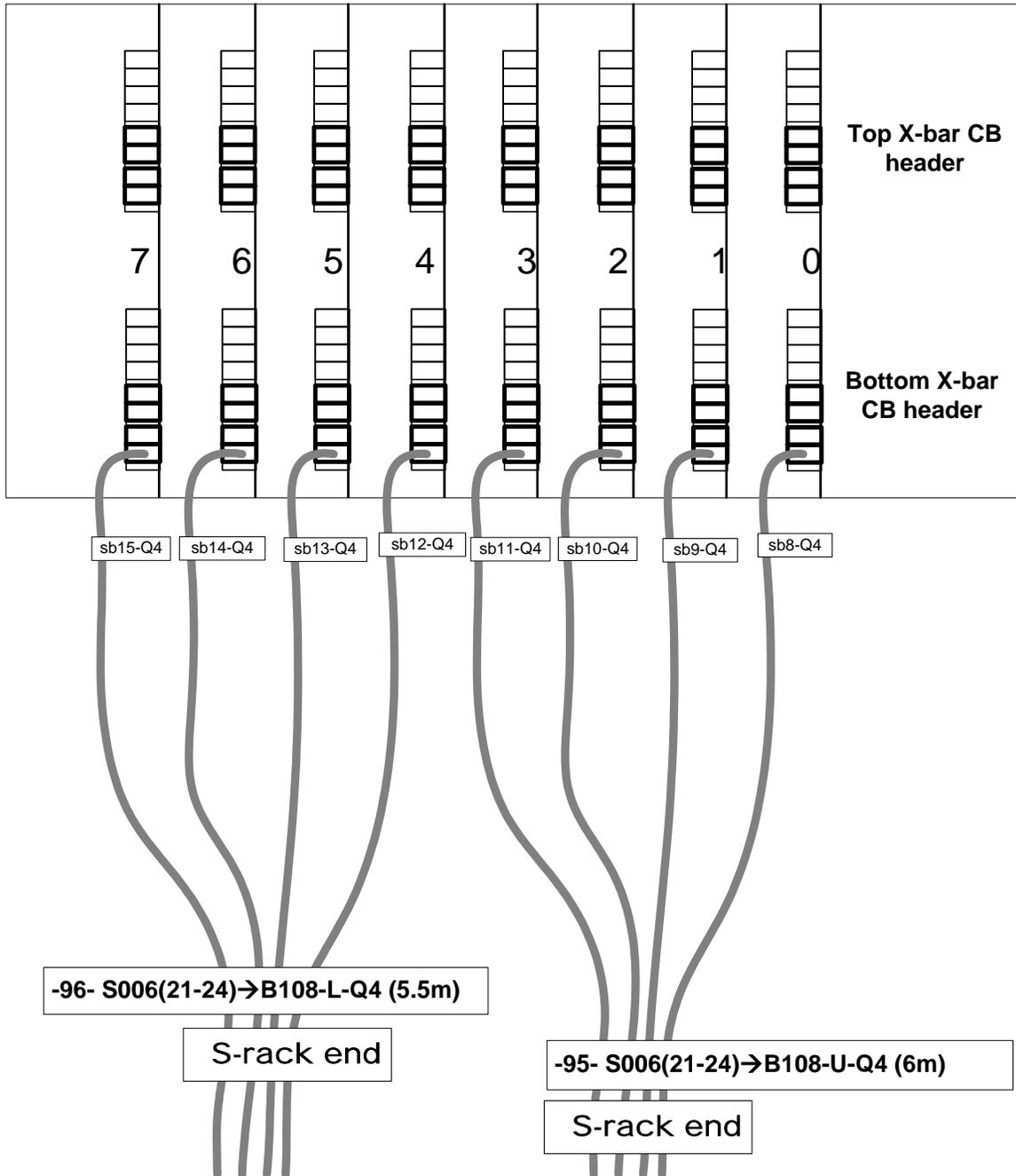
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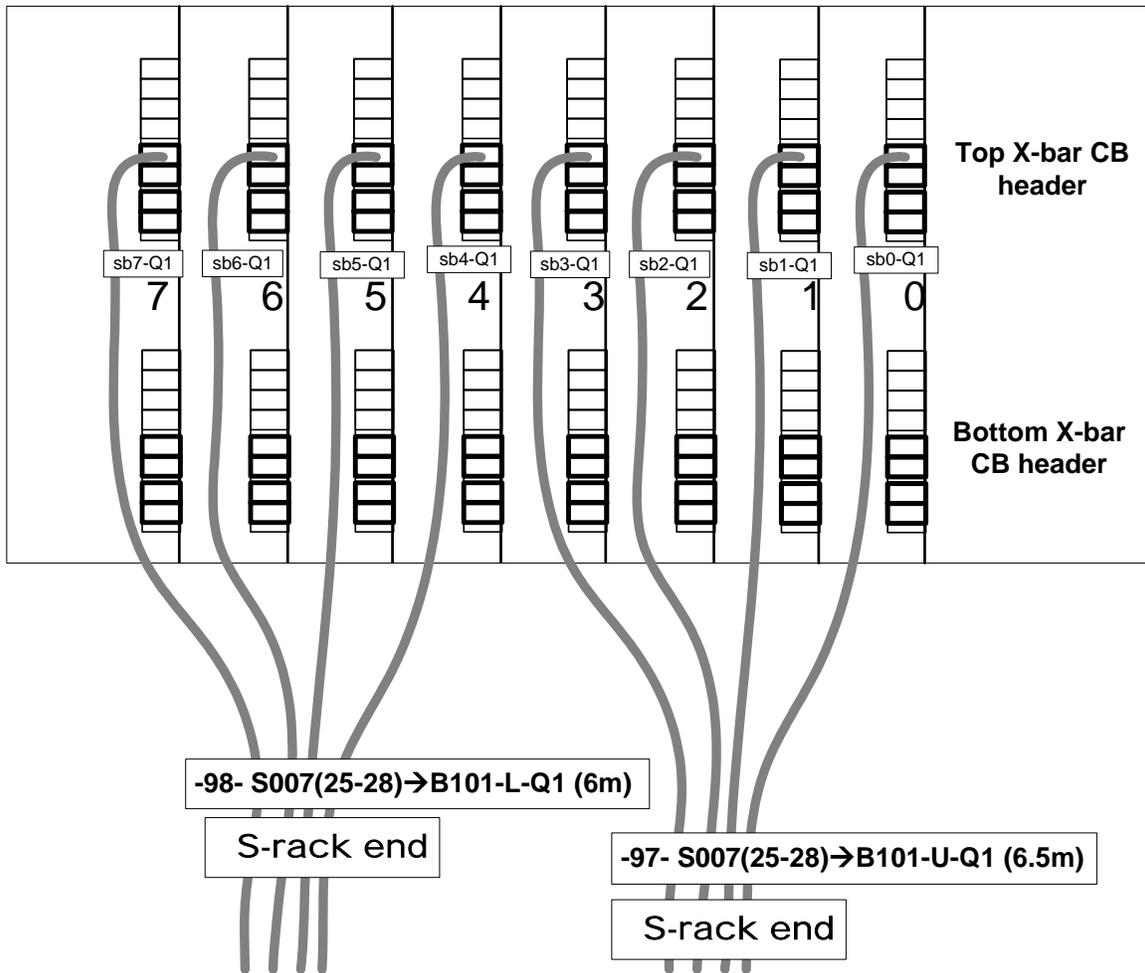
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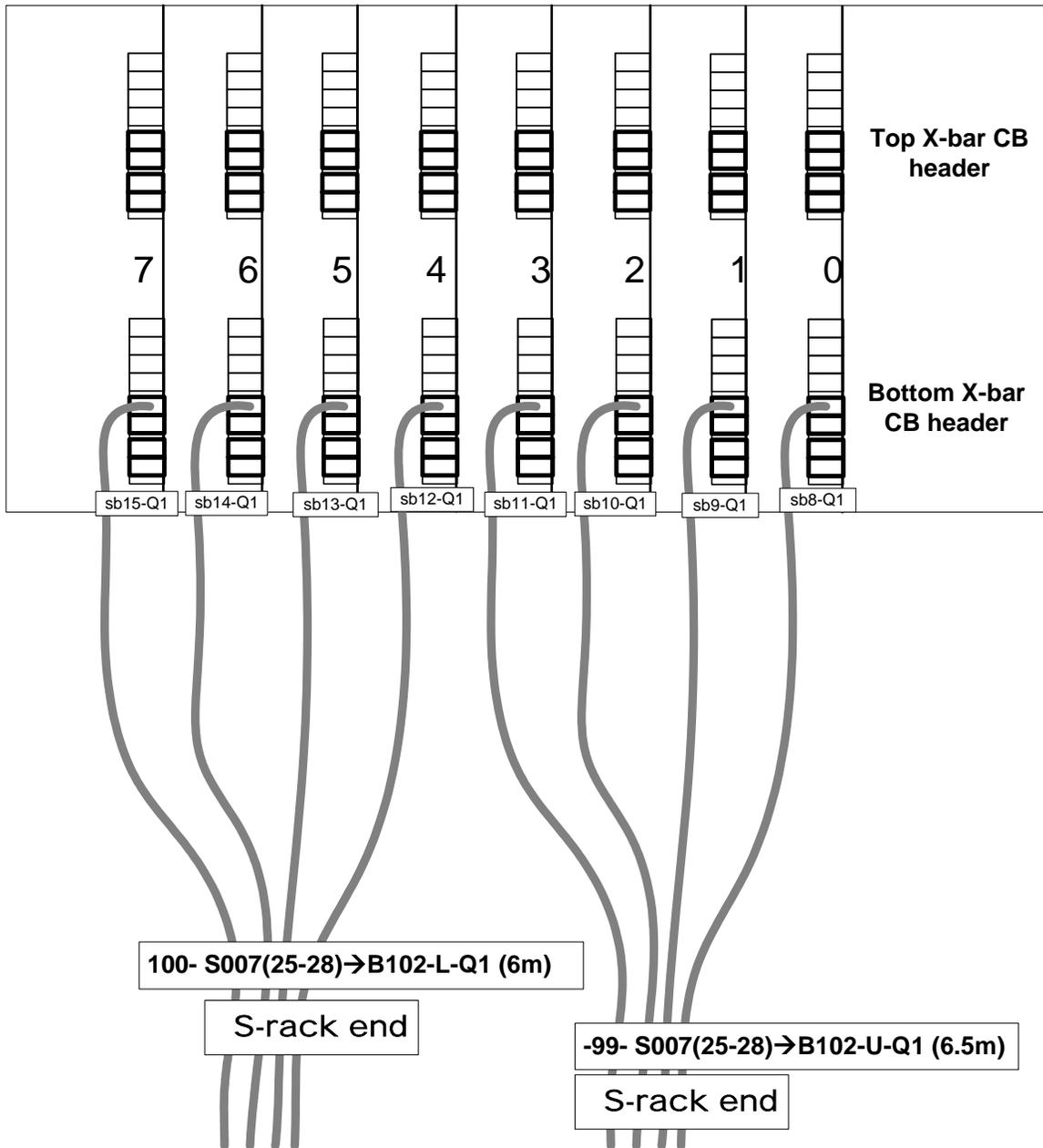
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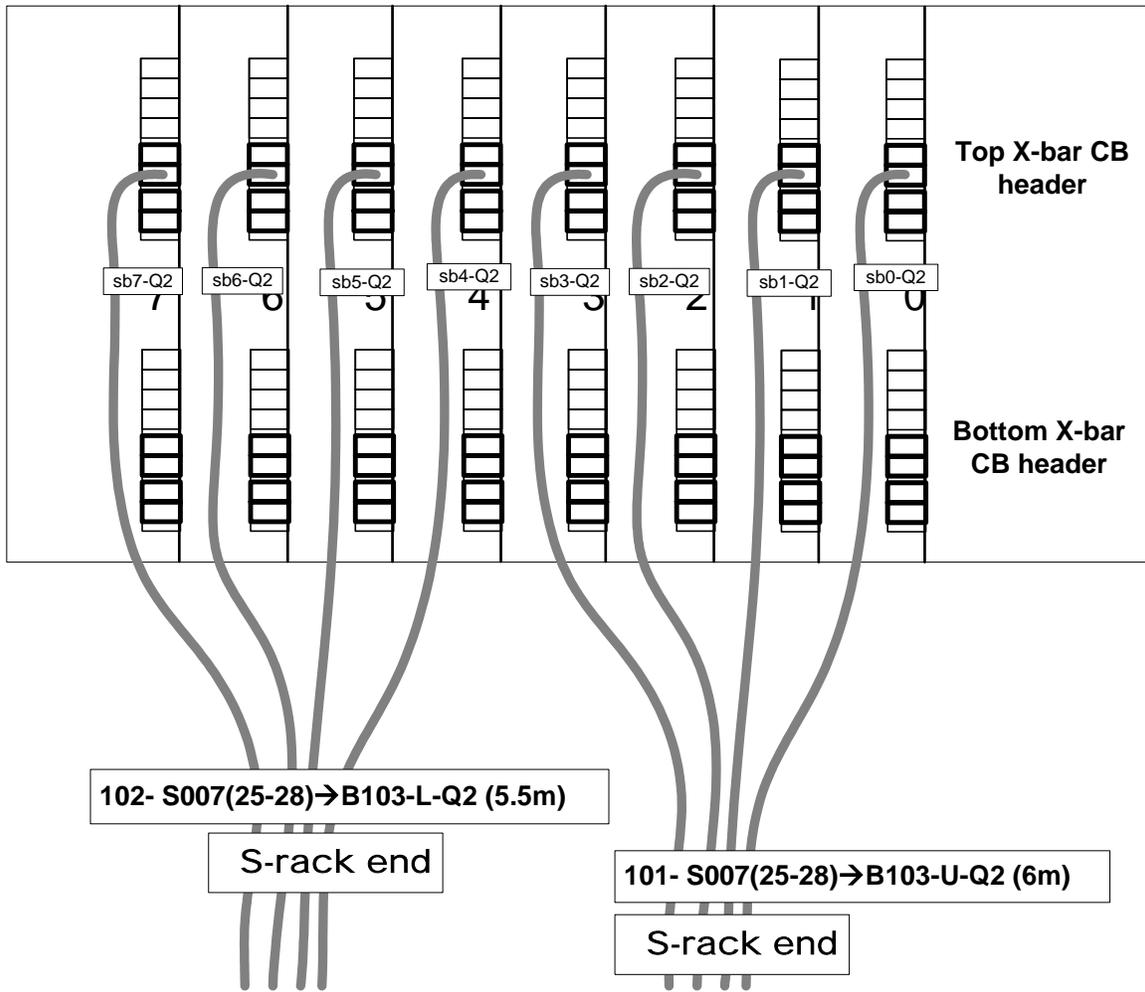
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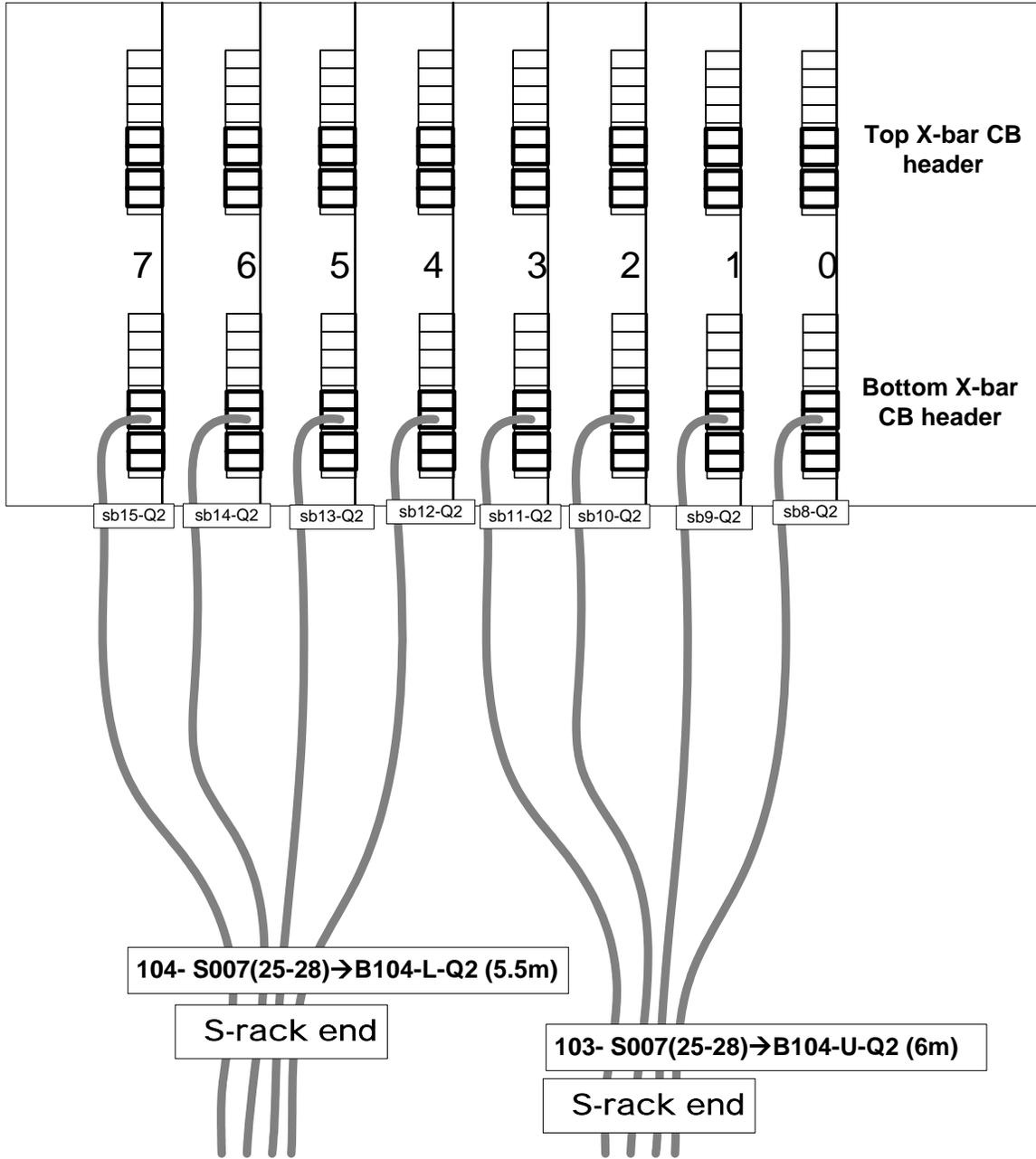
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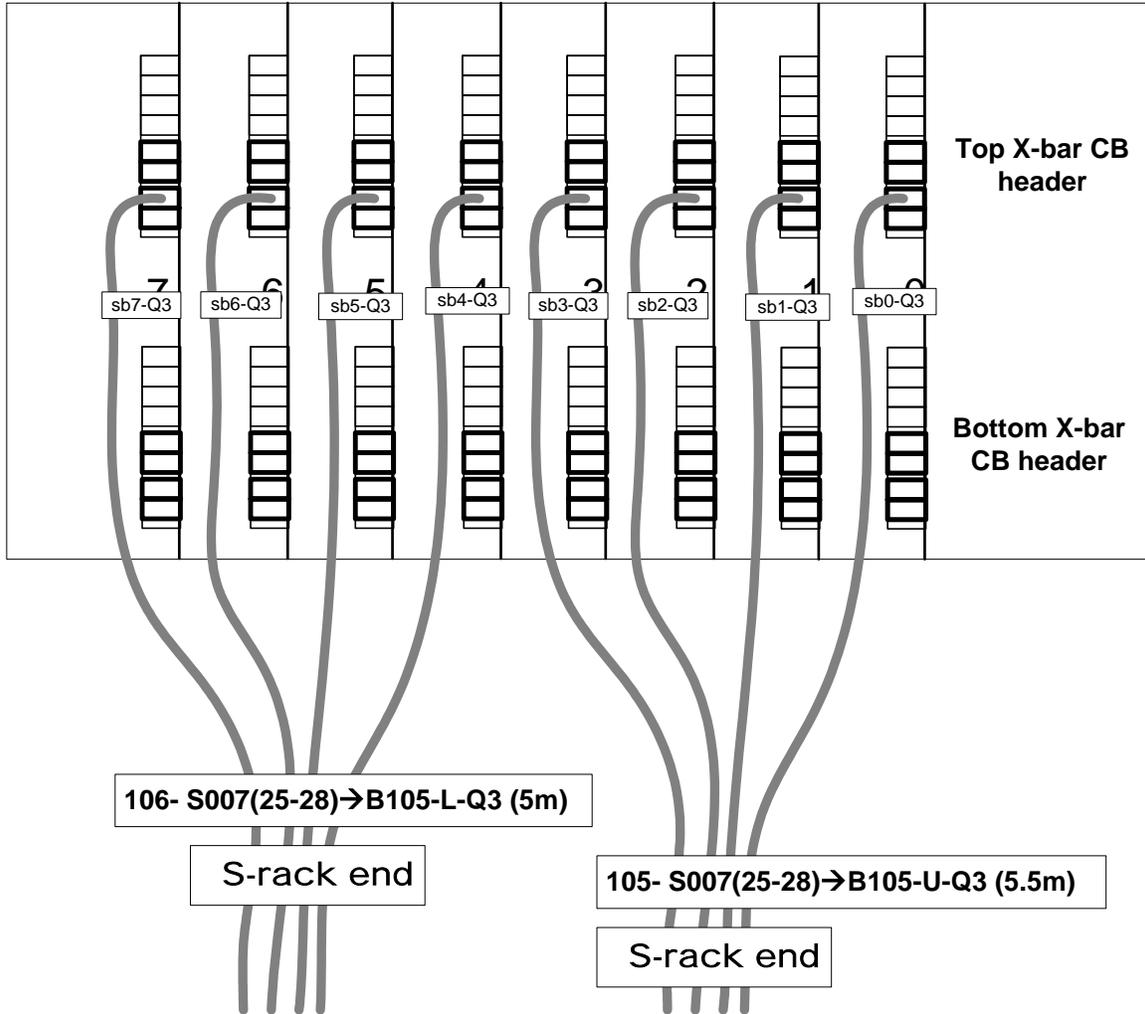
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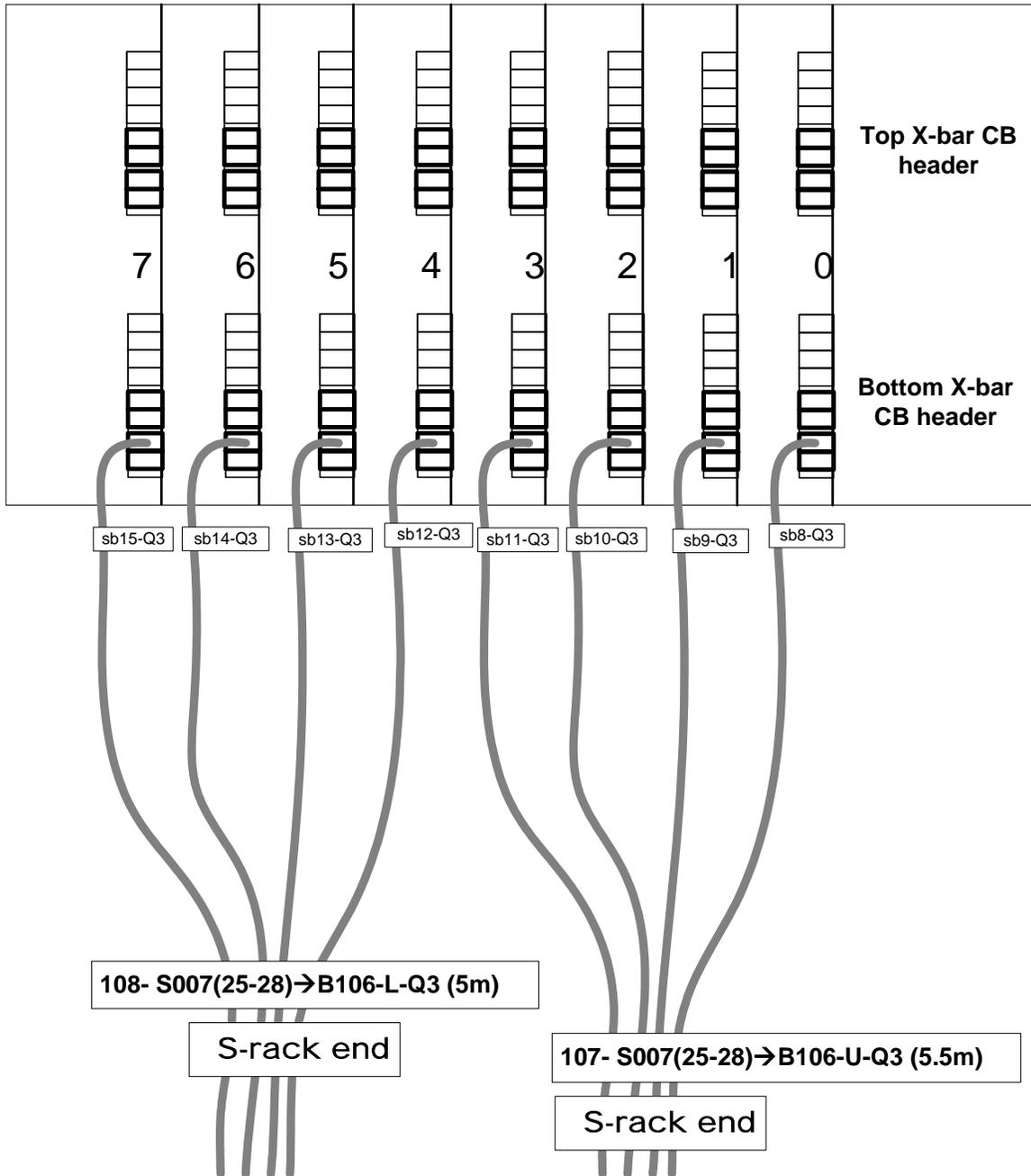
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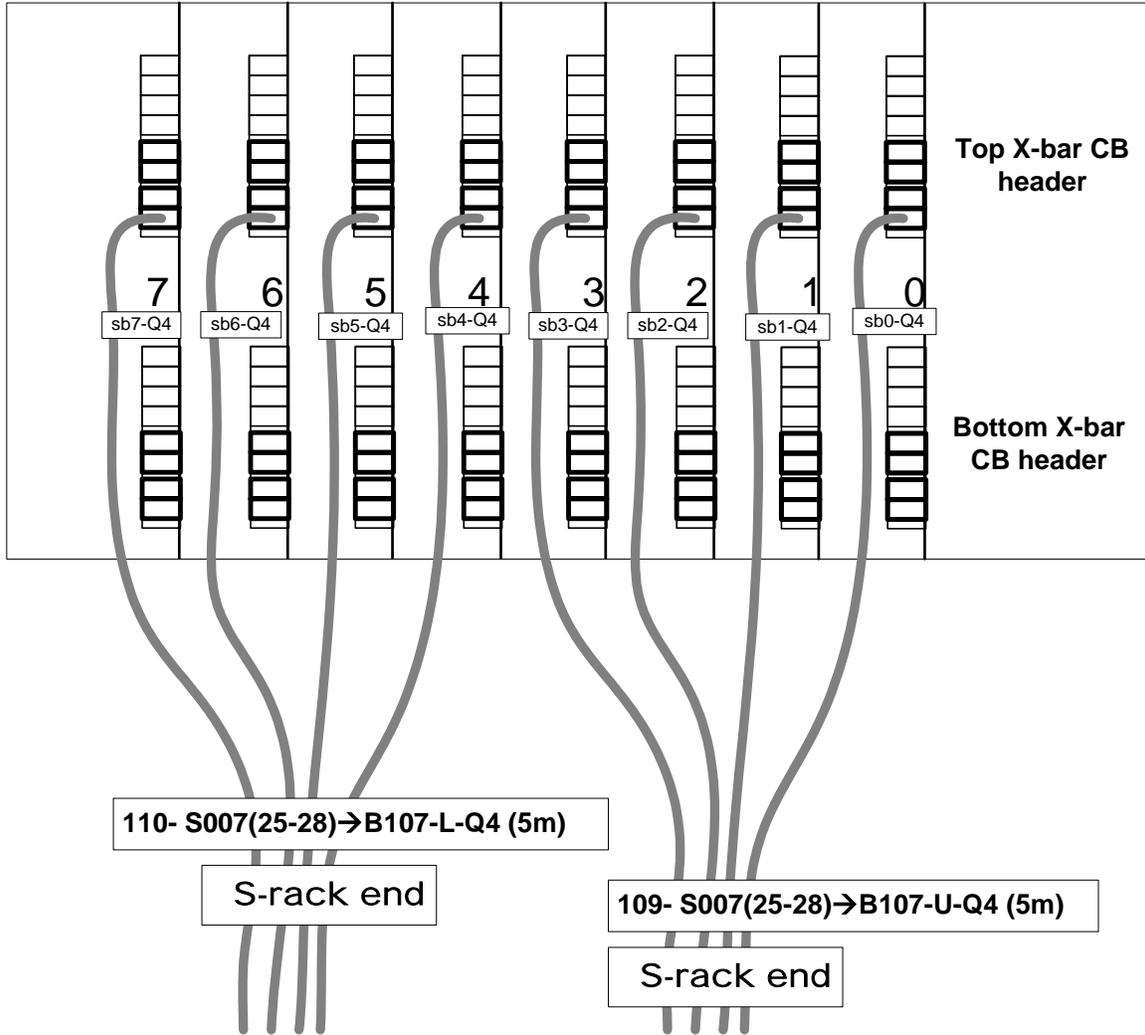
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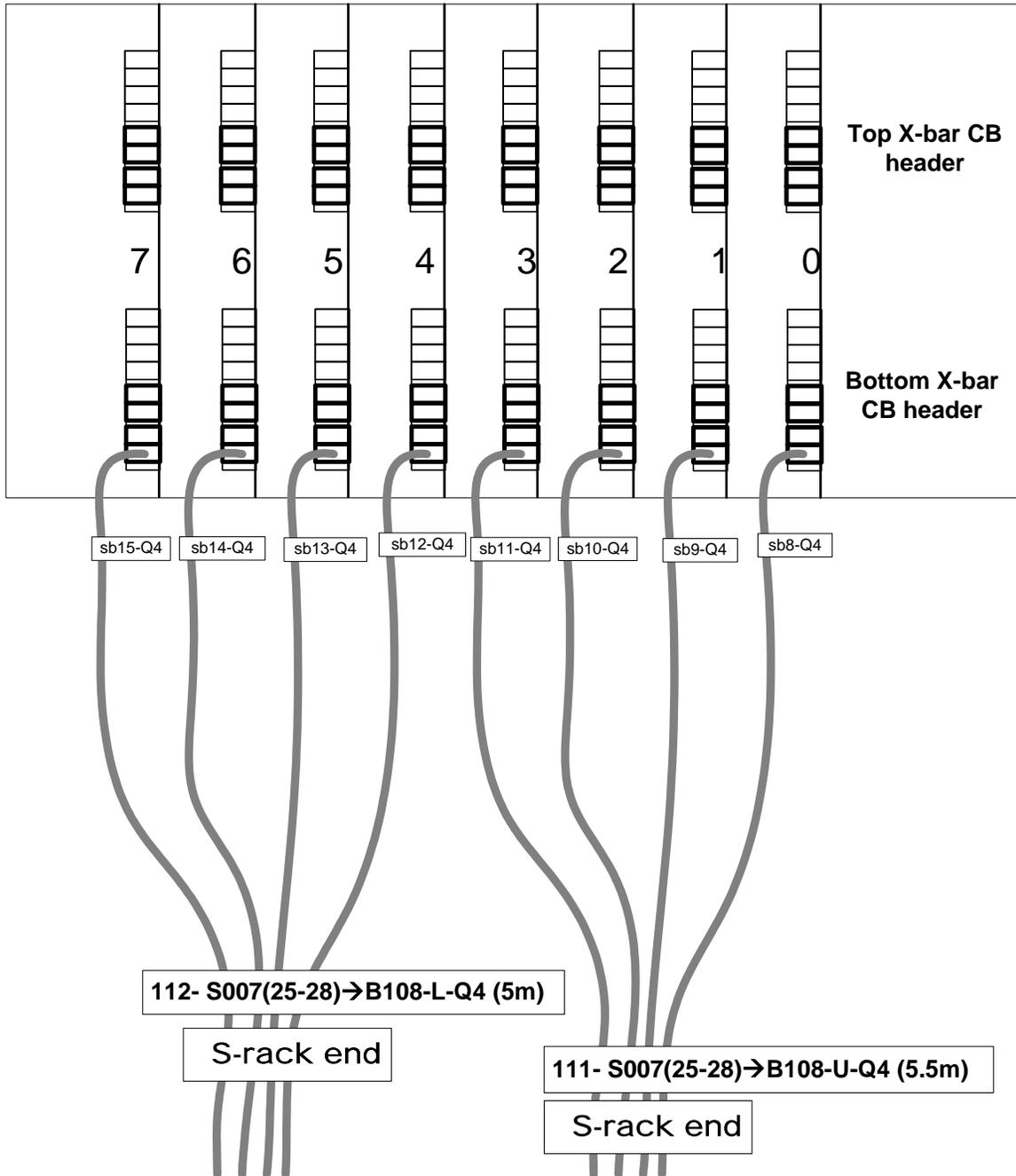
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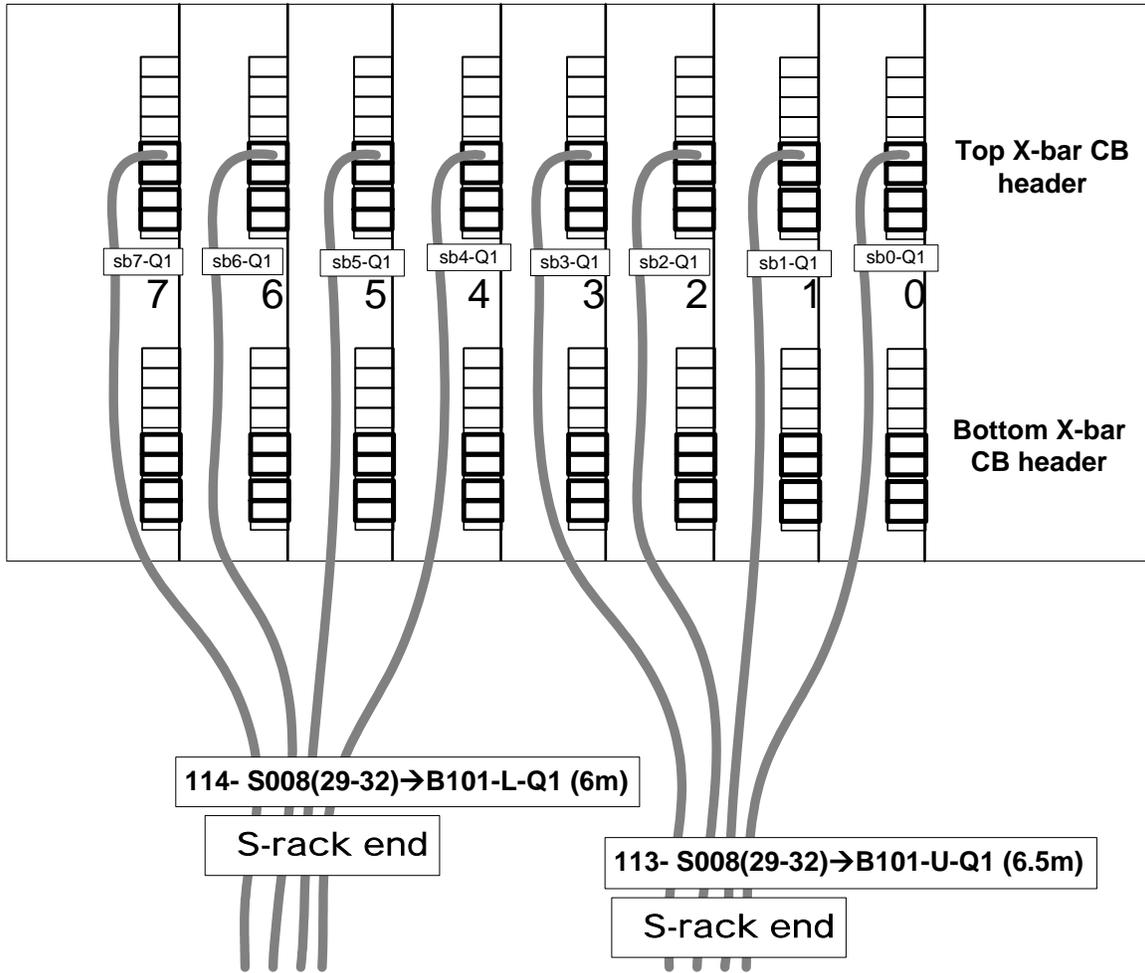
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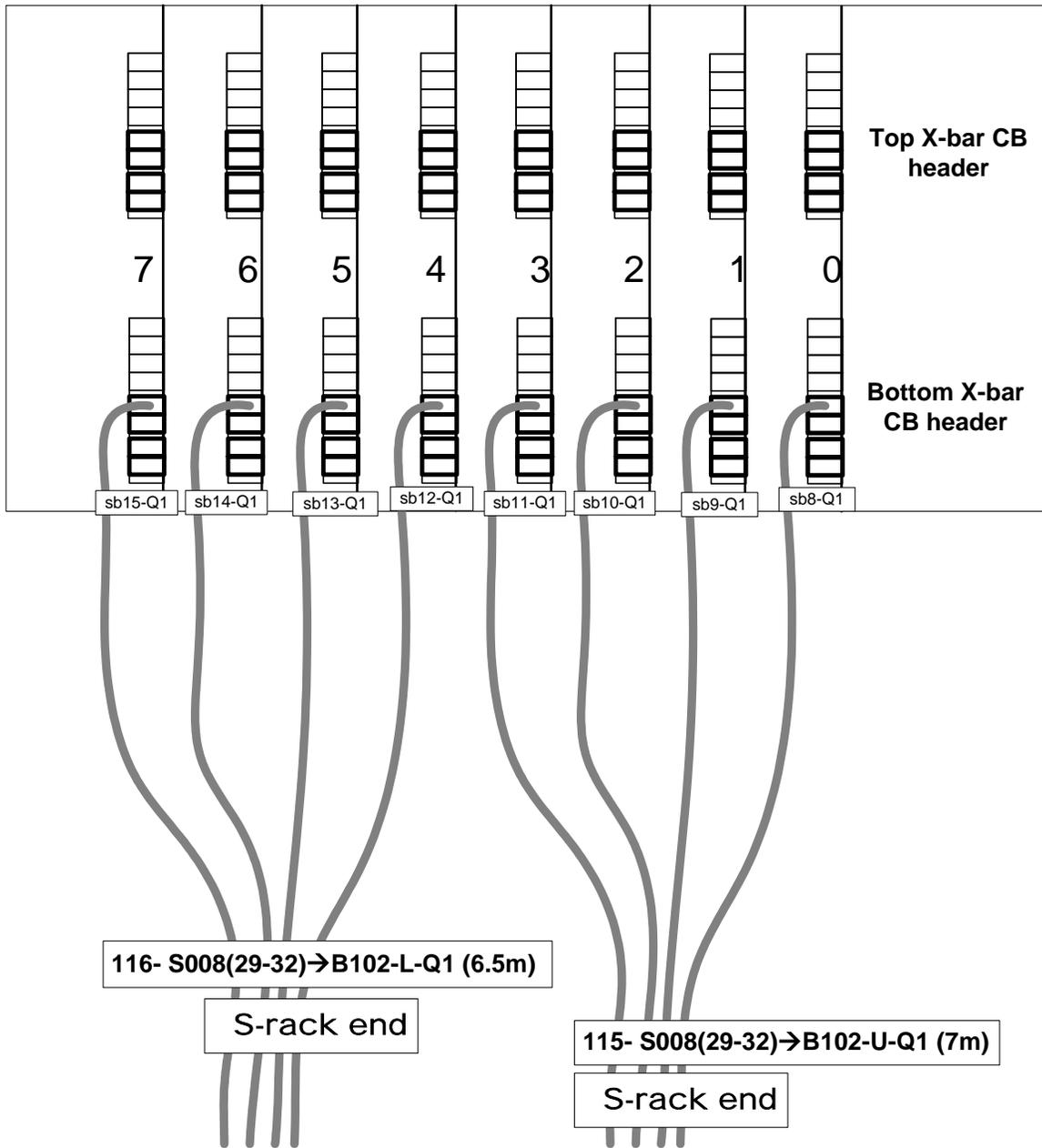
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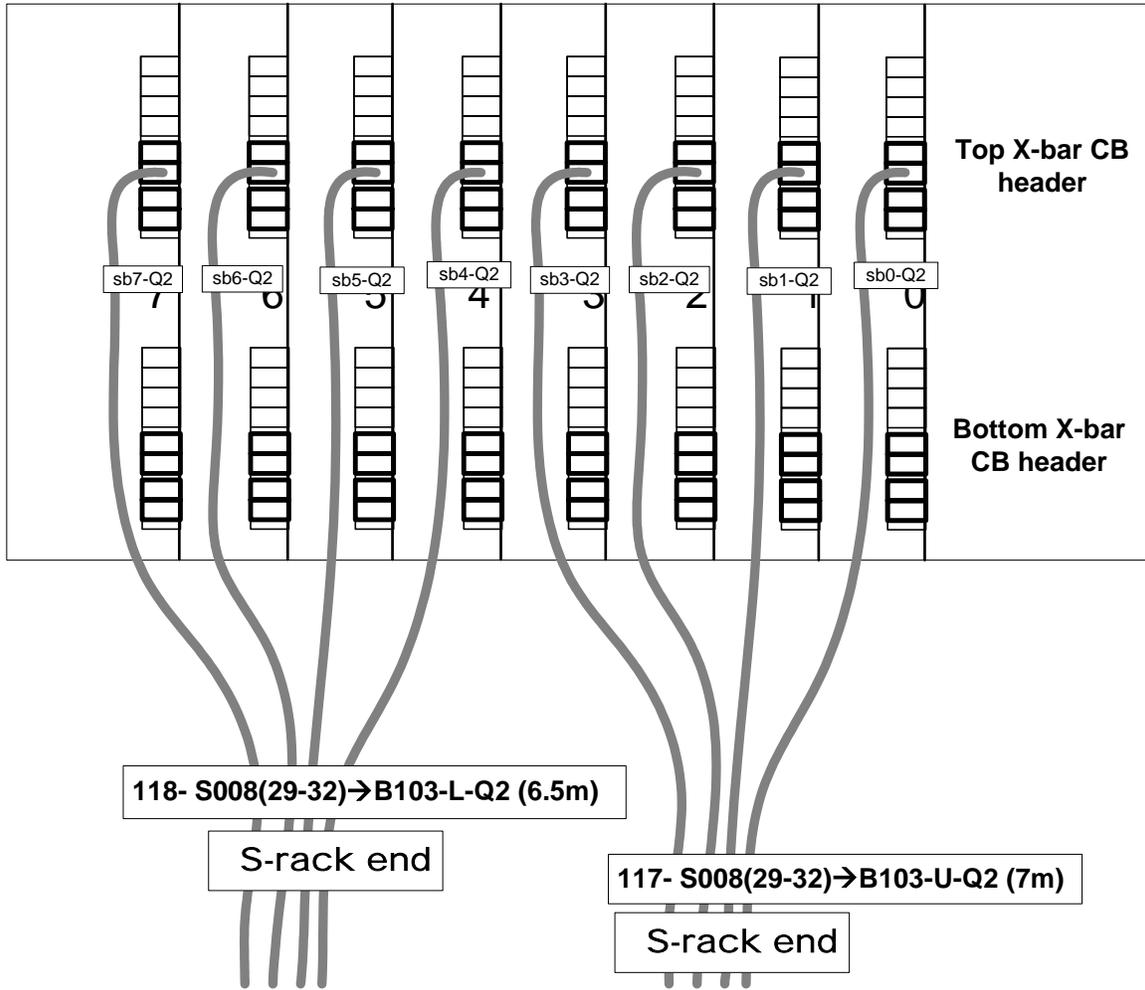
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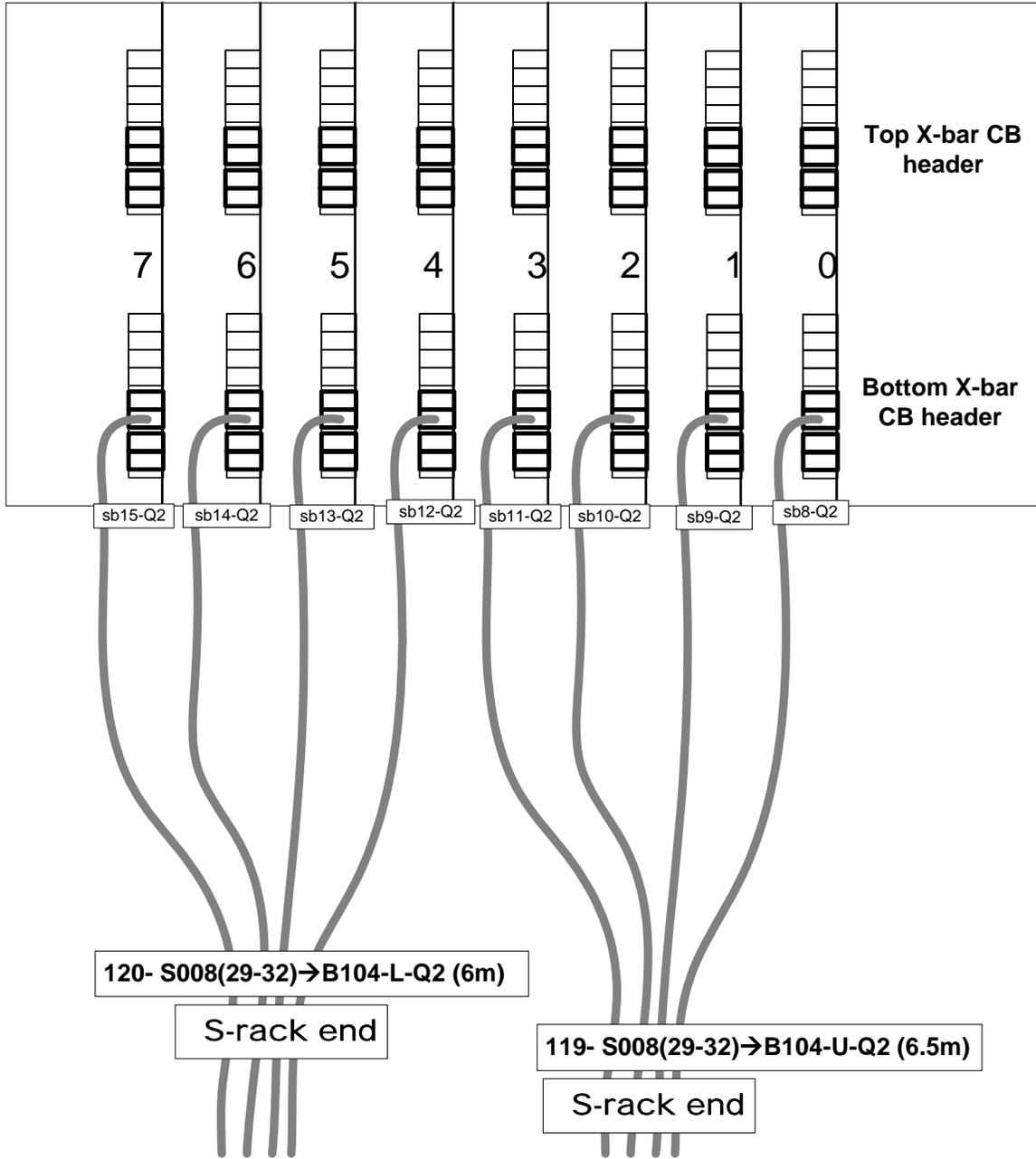
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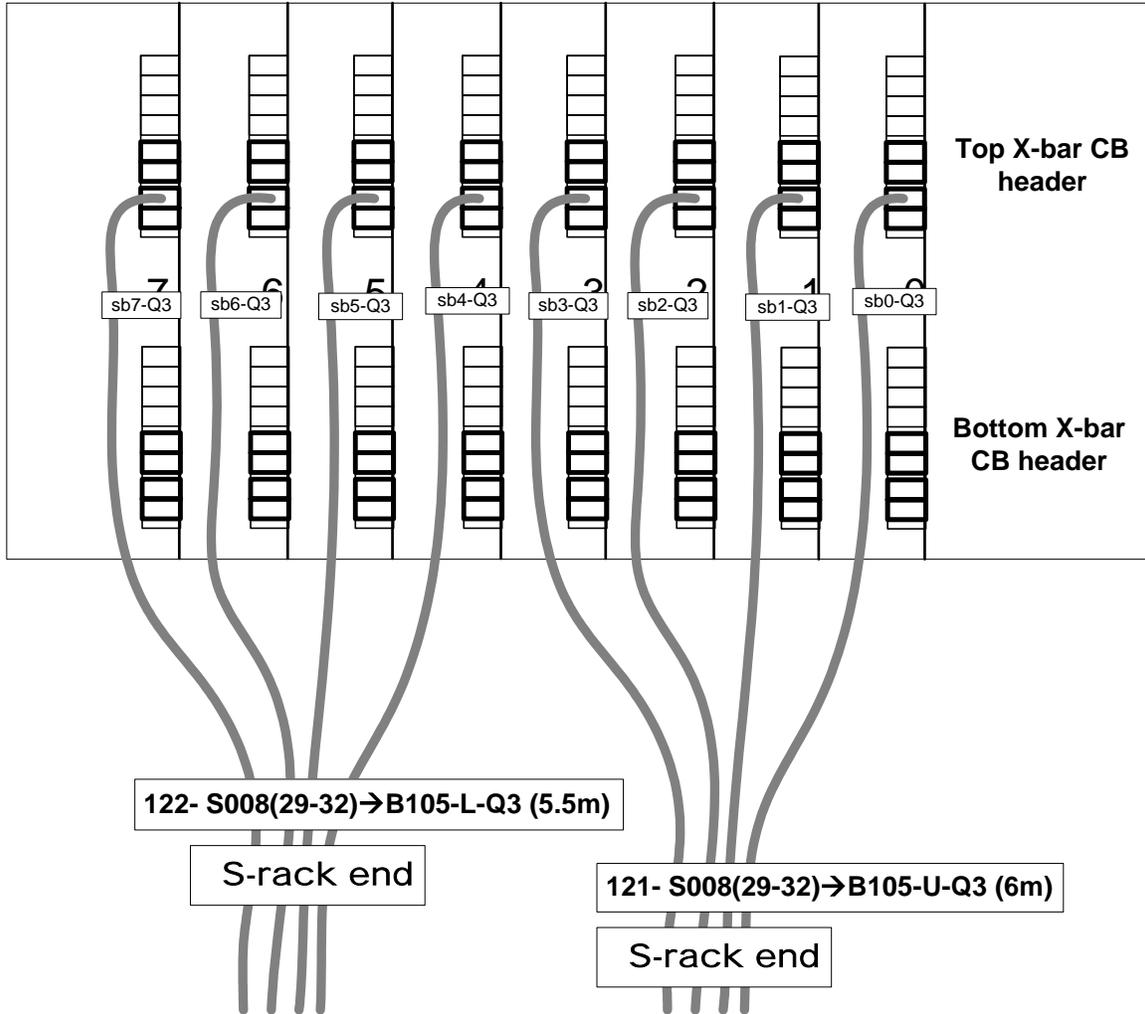
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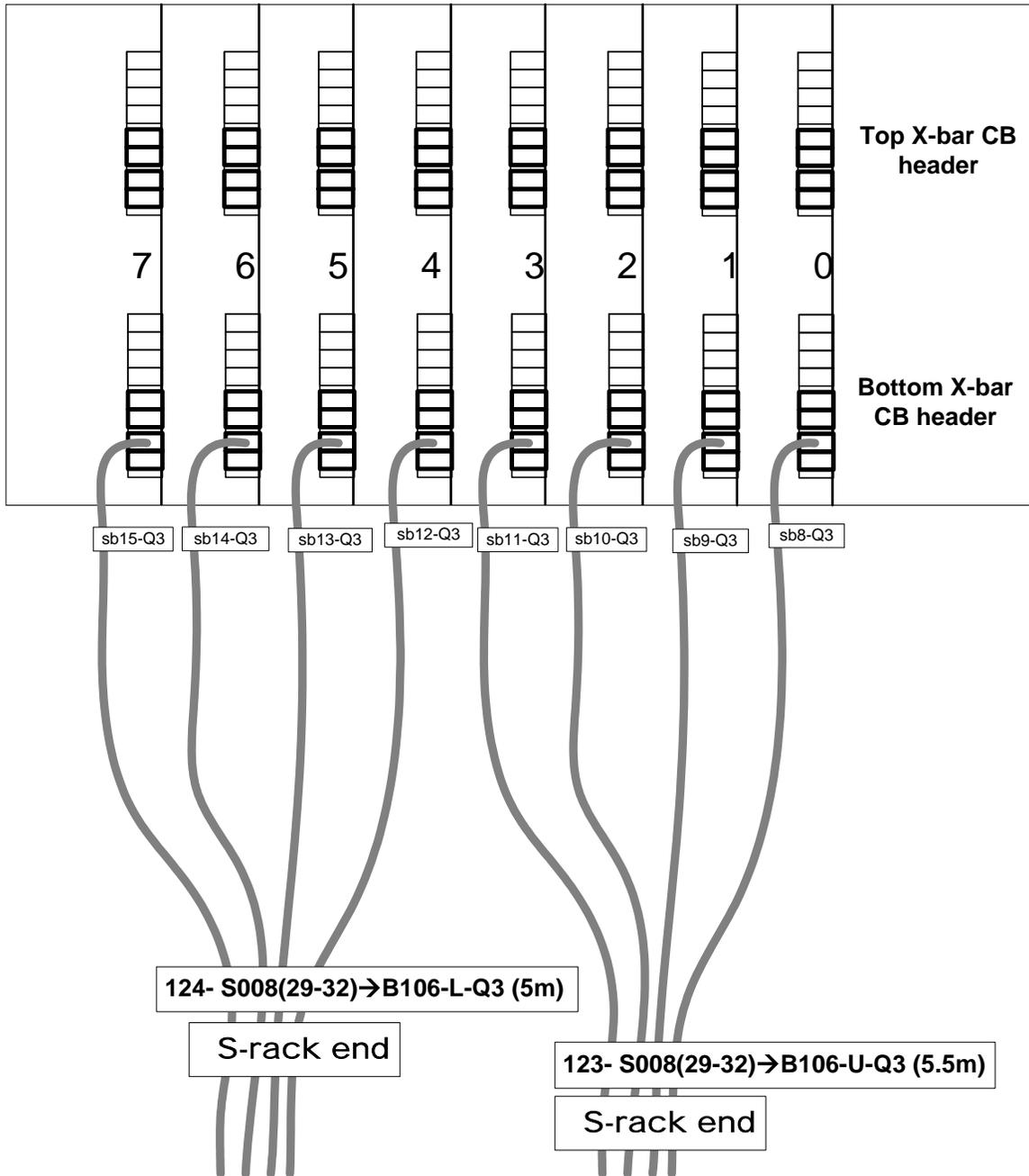
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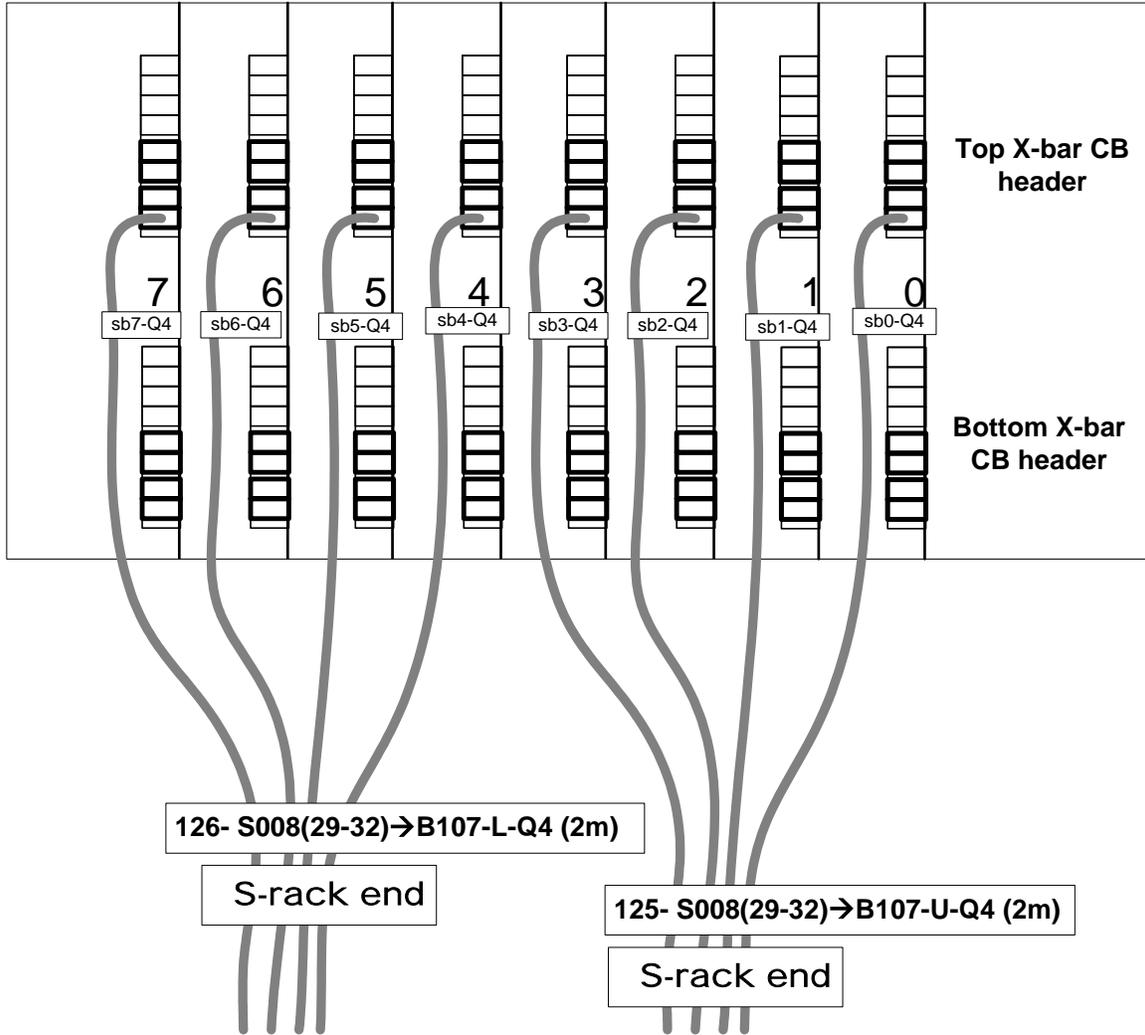
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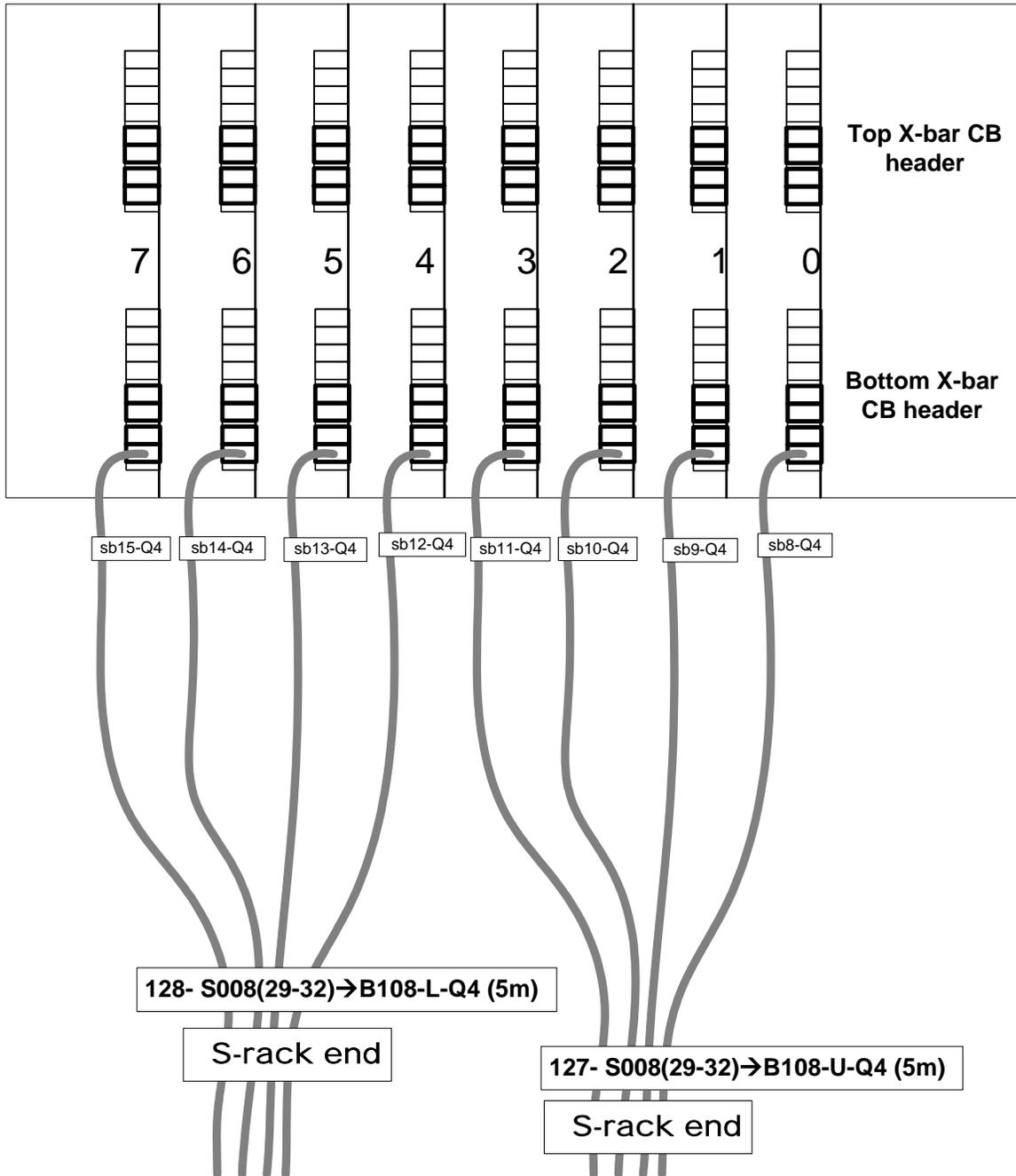
# S008



# S008



# S008



#### 4.2.2 B-Rack Cable Header Installation

This section contains instructions for installing cables into B-rack cable headers.

Figure 4-3 is a rear view of a B-rack showing the location of cable headers into which cables are installed.

Note station numbering (1-32) into the cable headers as well as sub-band assignments (for ODD-numbered B-racks); their logical arrangement is important to understand before beginning the install. NRC-Penticton personnel will be on hand to assist with this install.

Figure 4-4 is a rear view of an EVEN-numbered B-rack showing sub-band assignments.

Cables are installed with the cable connector *PLASTIC* facing UP in all cases.

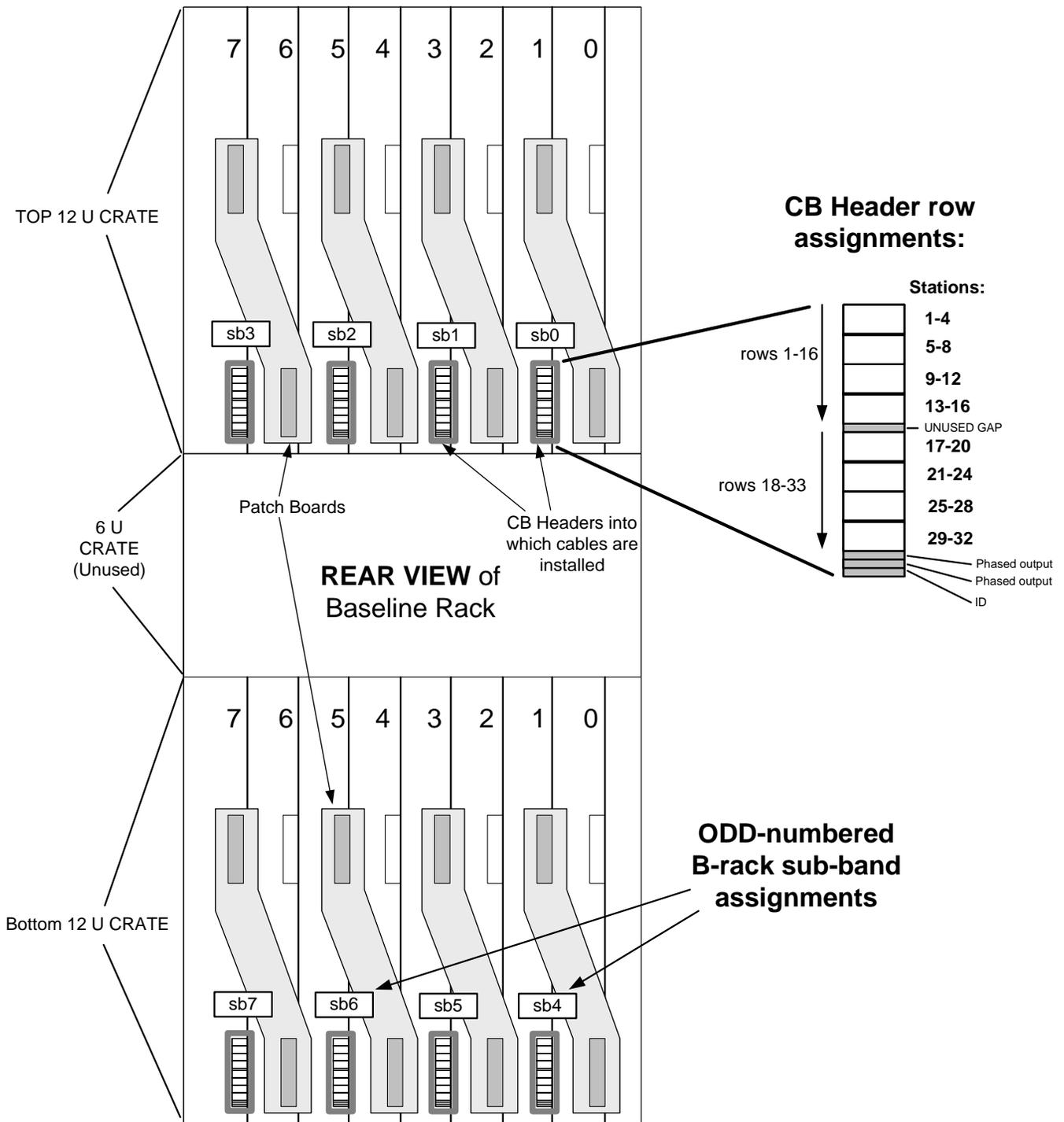
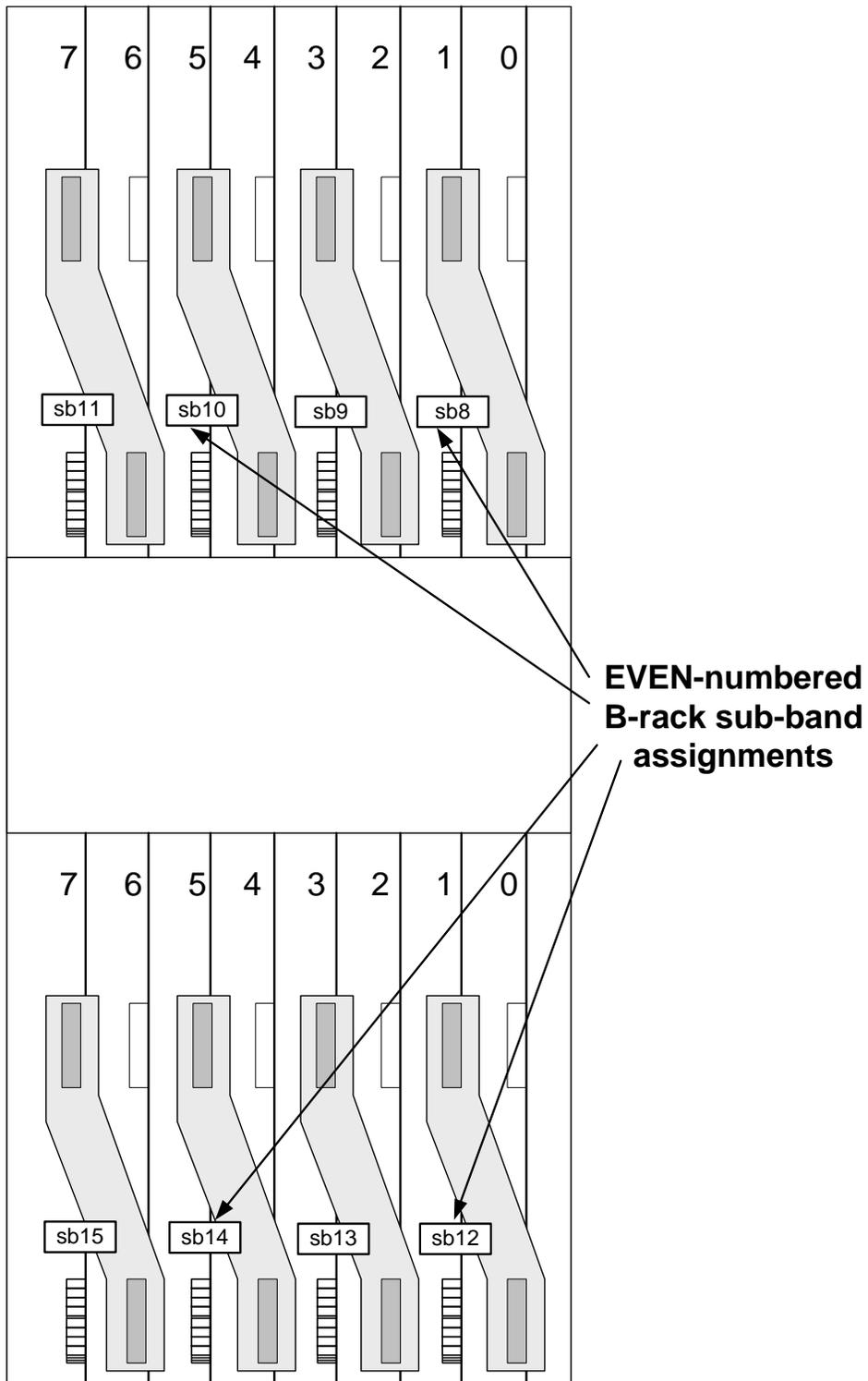


Figure 4-3 B-rack cable header assignments: sub-bands (ODD B-rack e.g. B101), stations.



**Figure 4-4 EVEN B-rack (e.g. B102) sub-band assignments.**

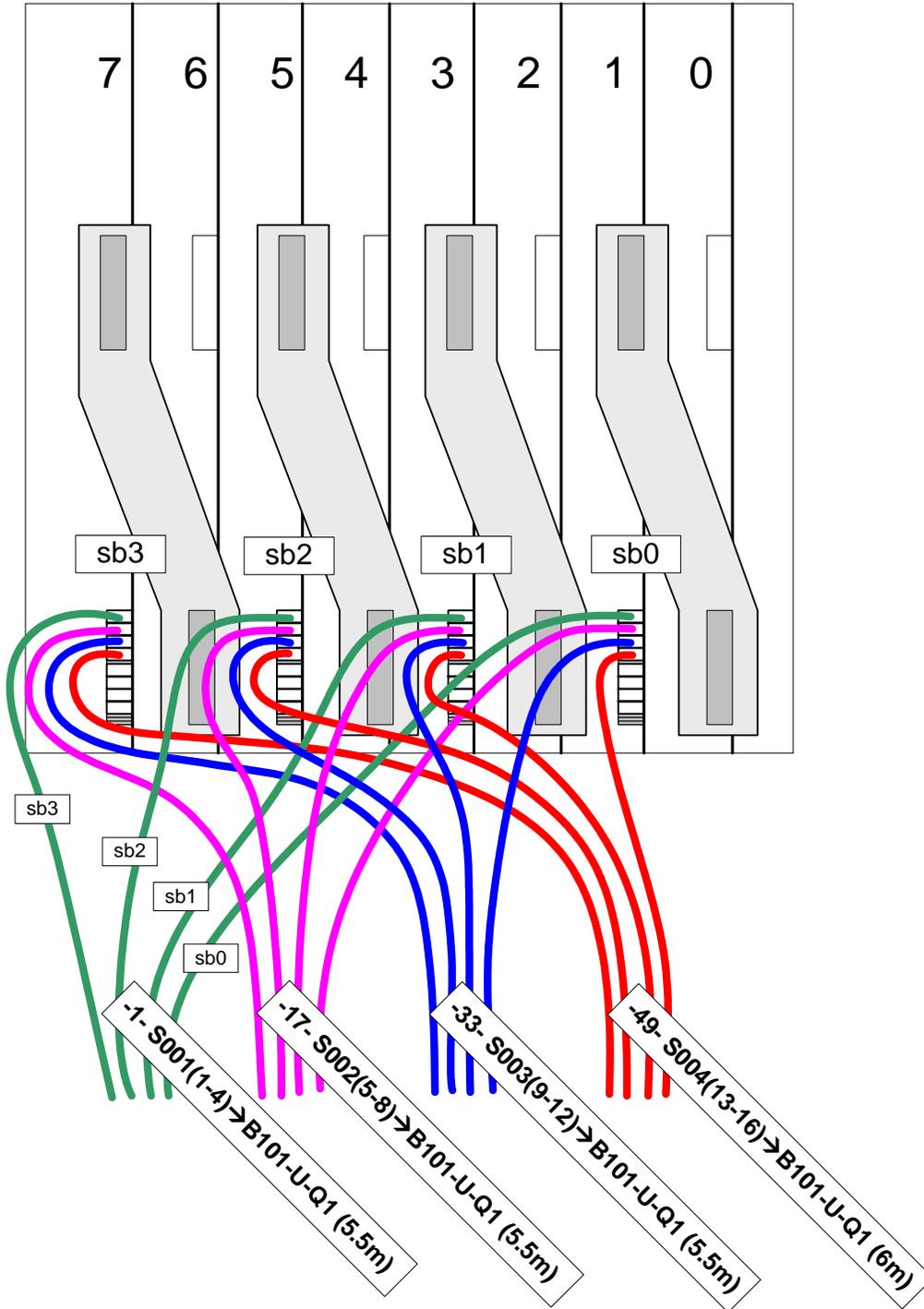
The following 32 pages show cable installation for B-racks **B101** to **B108**, which form quadrants “**Q1**” to “**Q4**”.

Use **extreme care** when installing cables into Common Backplane (CB) headers!

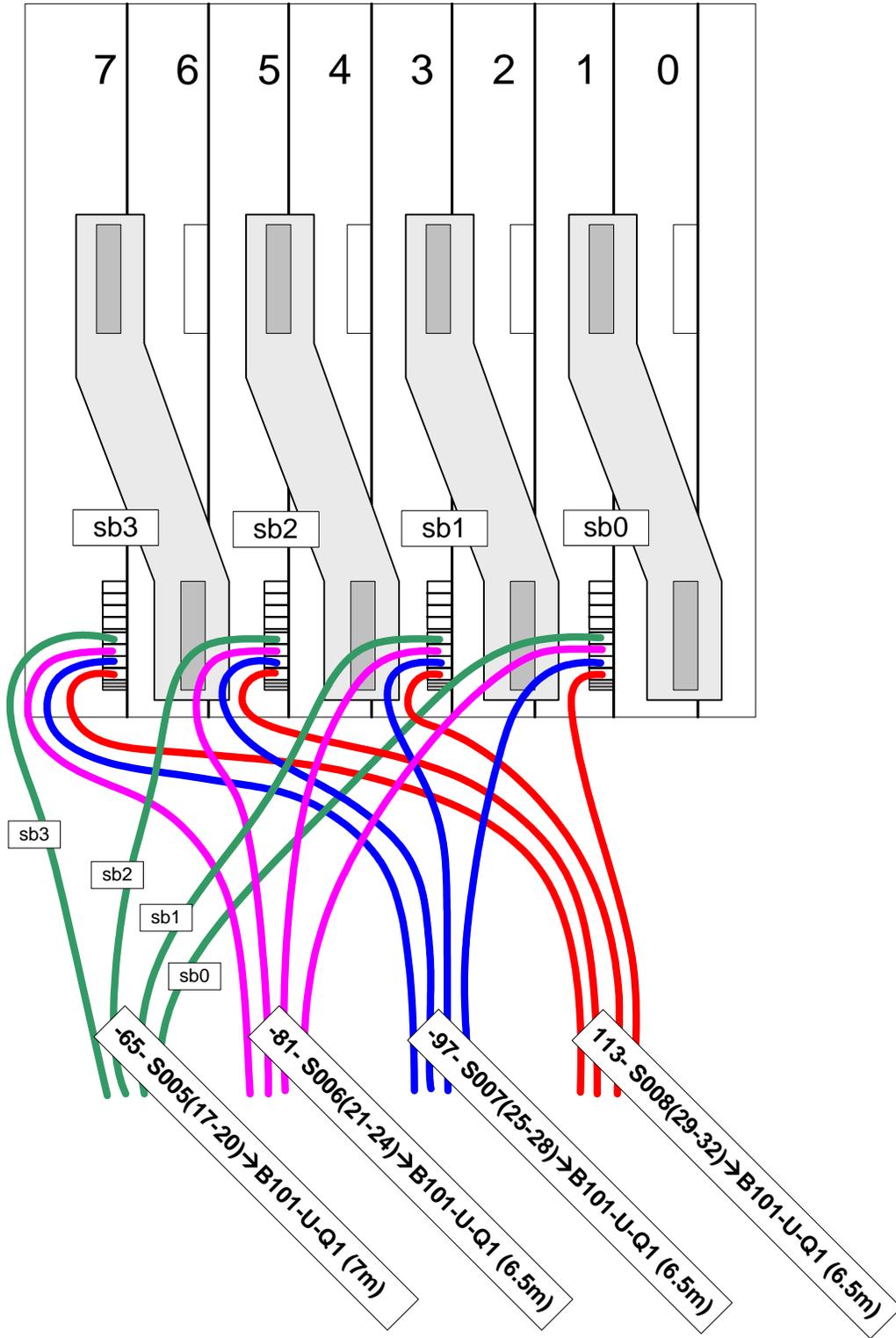
If the connector won't engage, it likely means misalignment, and **further mechanical force will damage CB header pins.**

✓ Once cables for a rack are installed, secure them with strain relief bars provided.

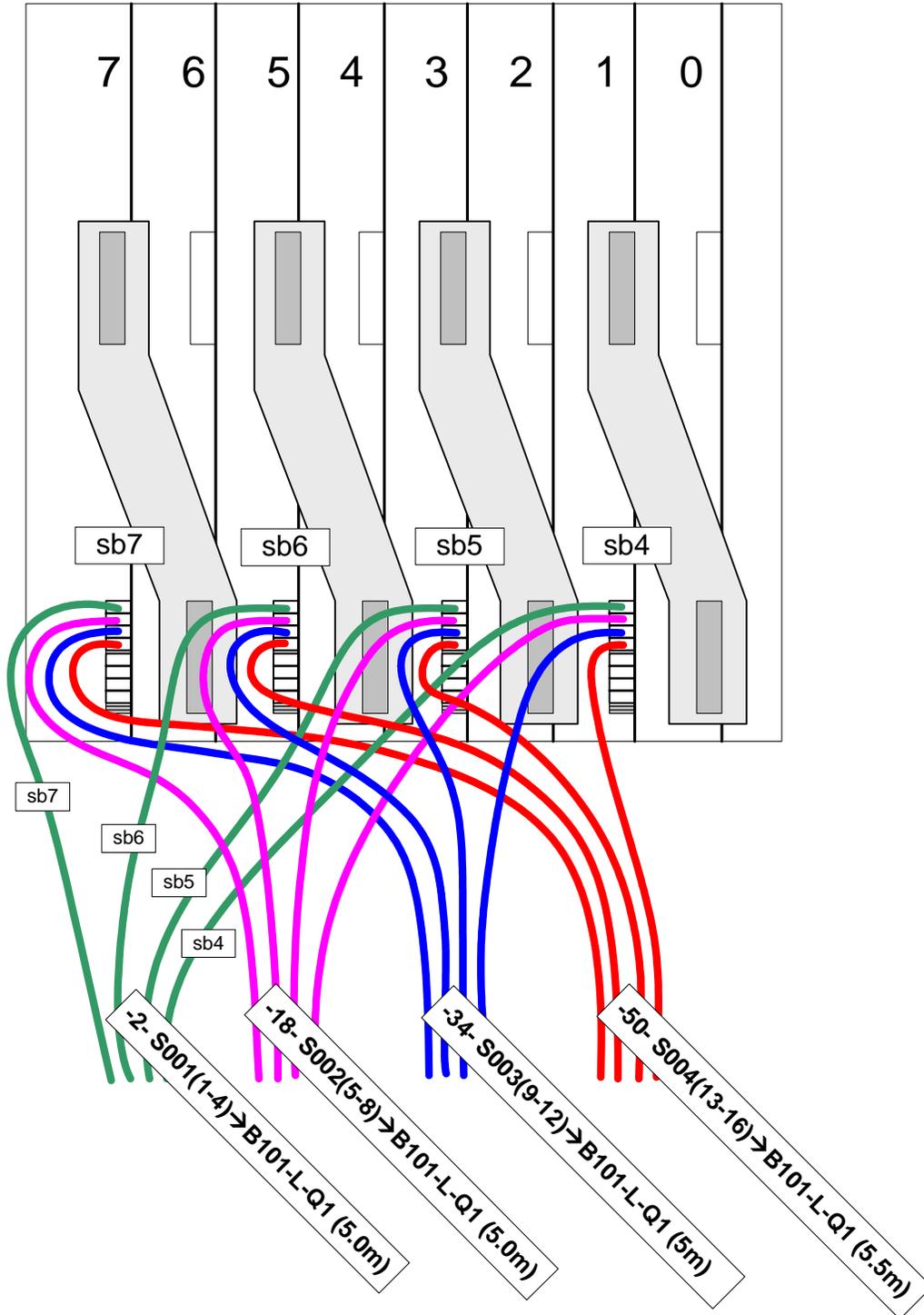
# B101:Q1 - Top/Upper Crate: sb0-3, stations 1-16



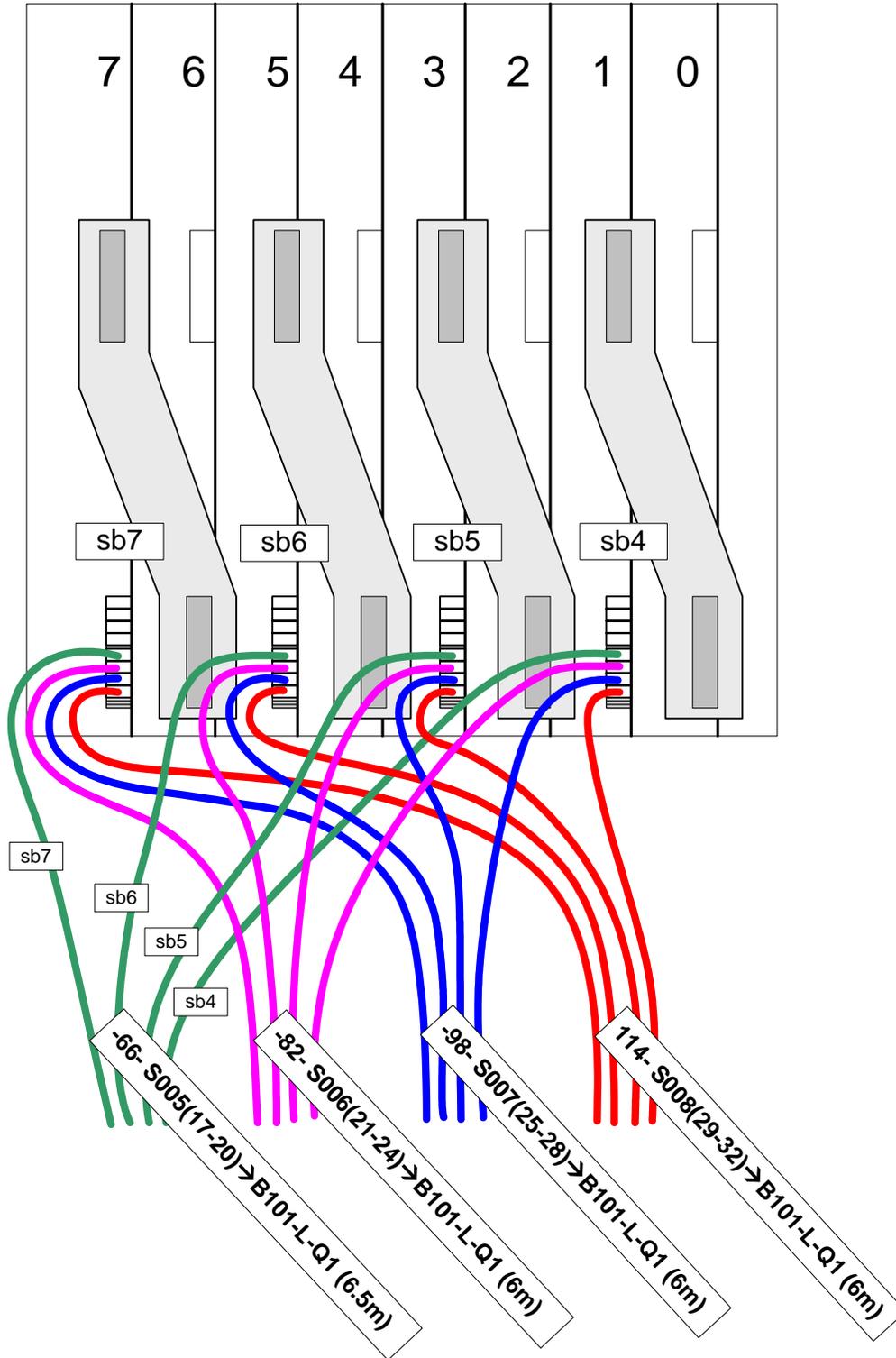
# B101:Q1 - Top/Upper Crate: sb0-3, stations 17-32



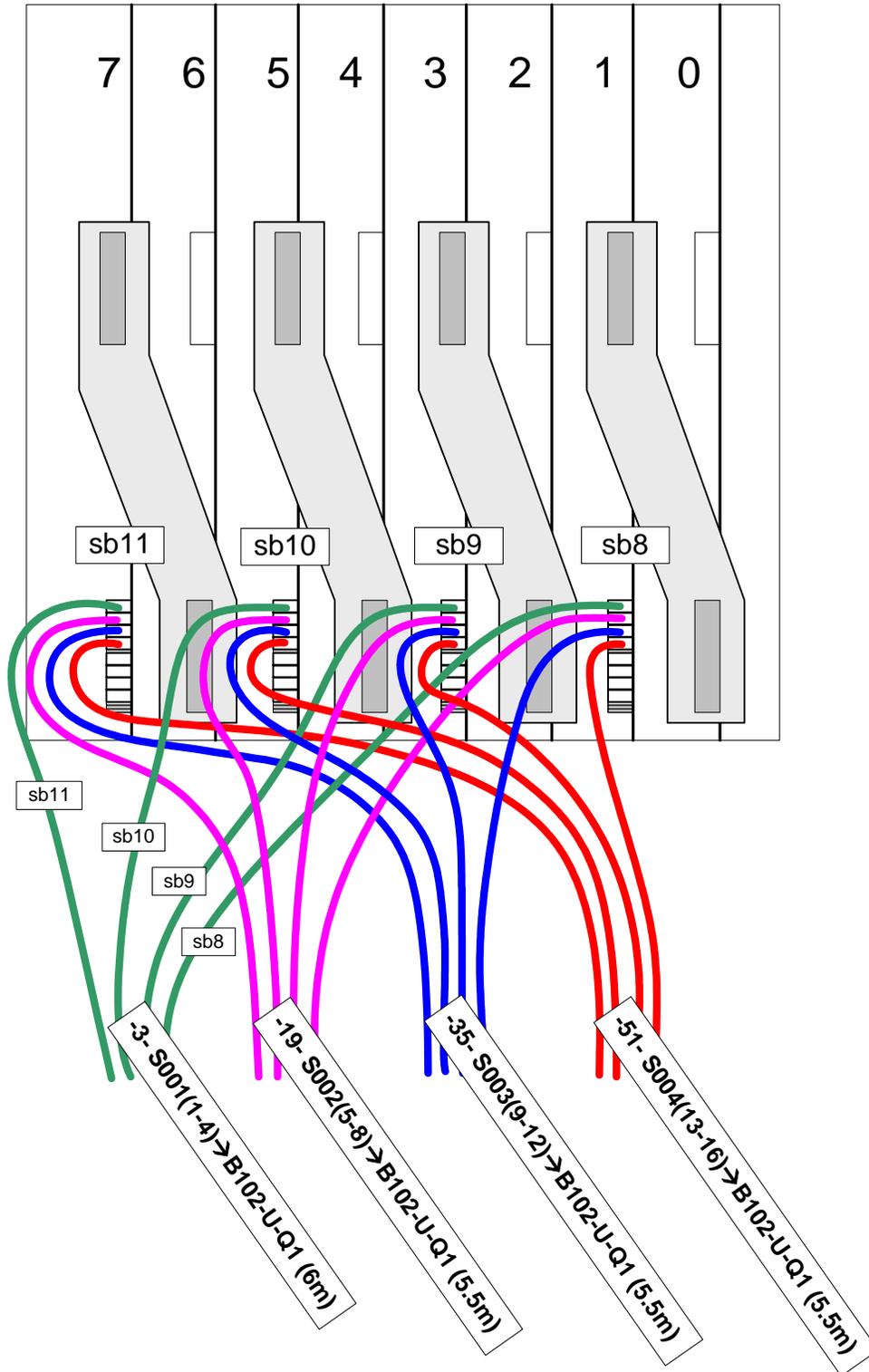
# B101:Q1 - Bottom/Lower Crate: sb4-7, stations 1-16



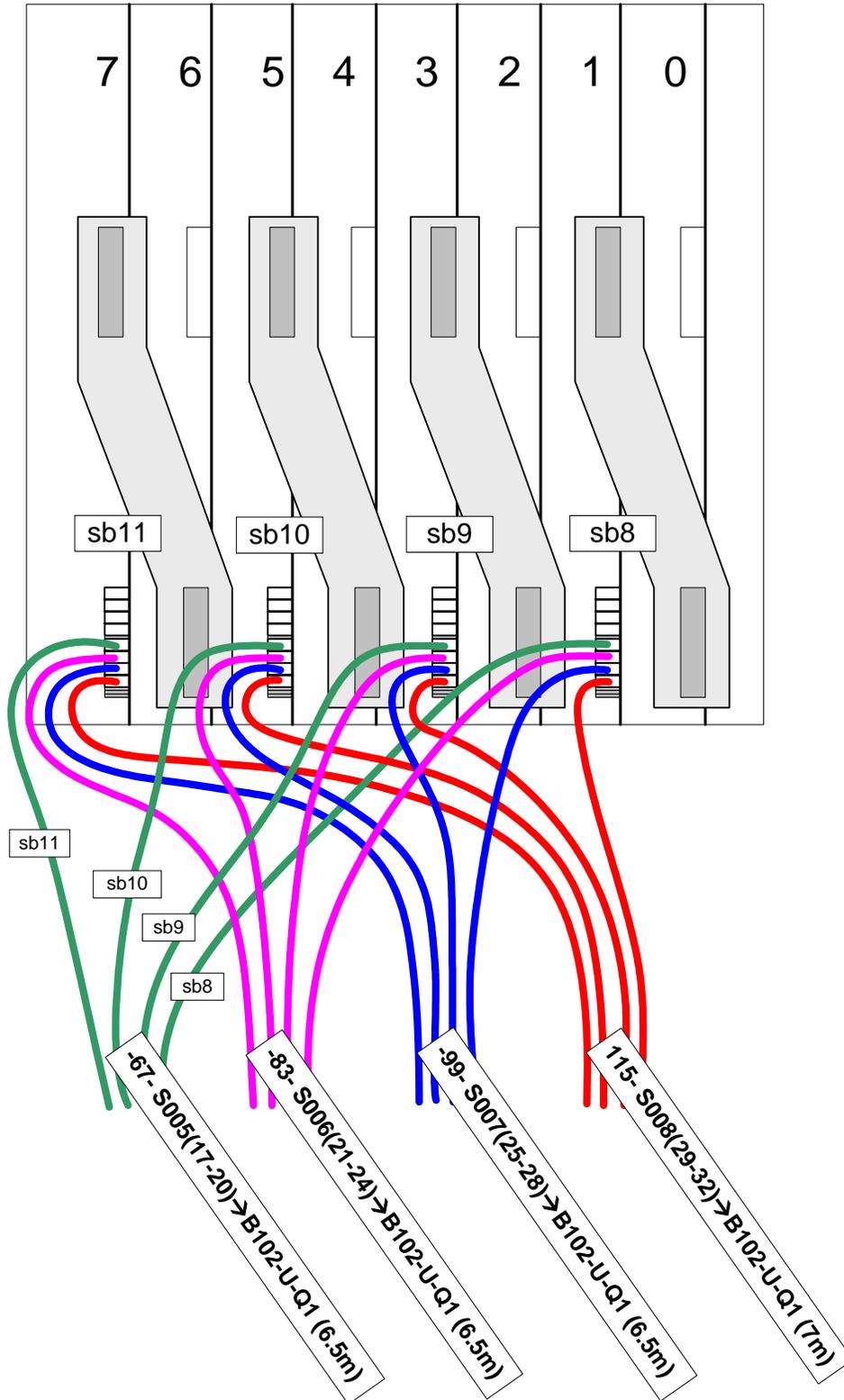
# B101:Q1 - Bottom/Lower Crate: sb4-7, stations 17-32



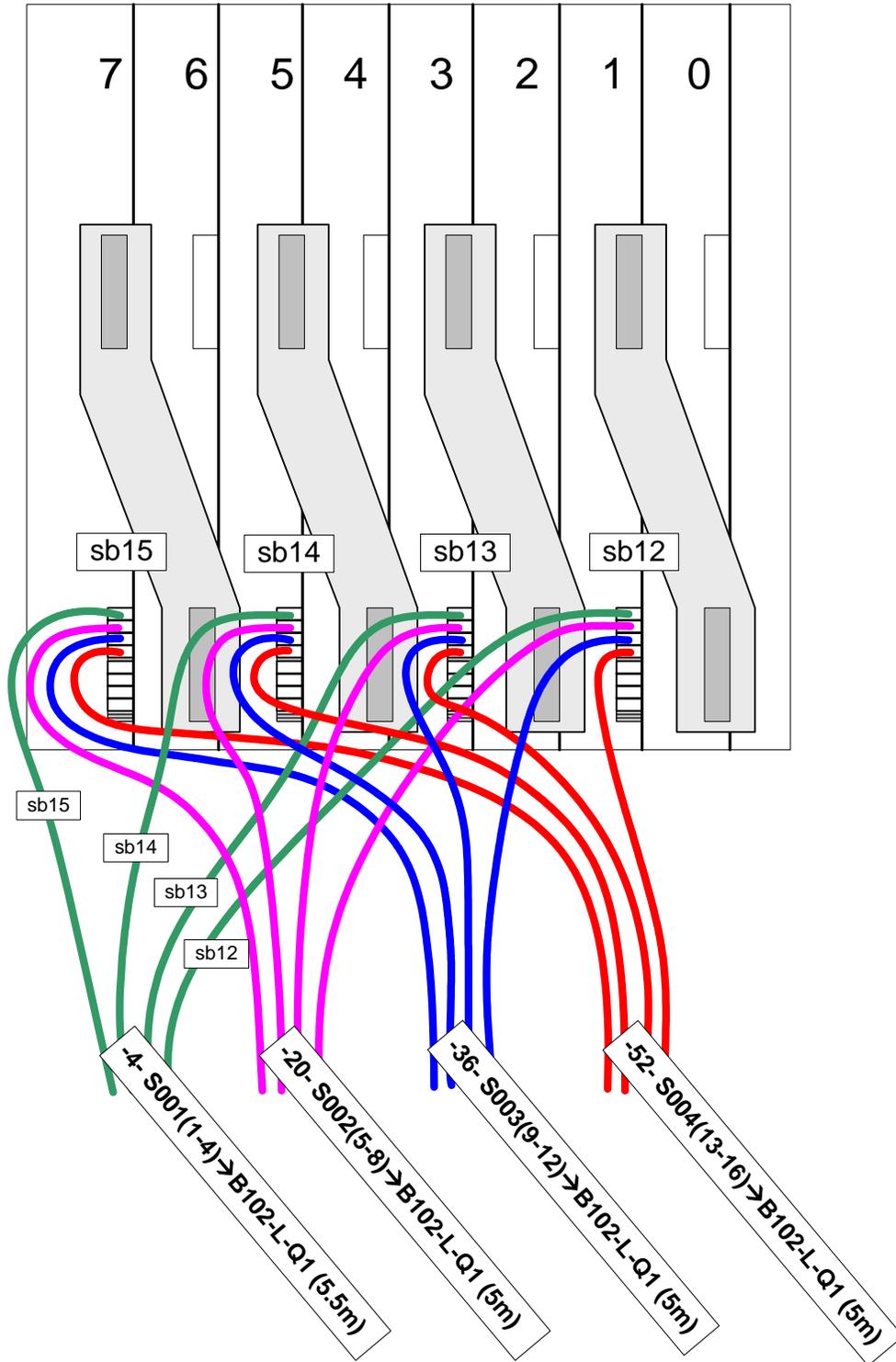
# B102:Q1 - Top/Upper Crate: sb8-11, stations 1-16



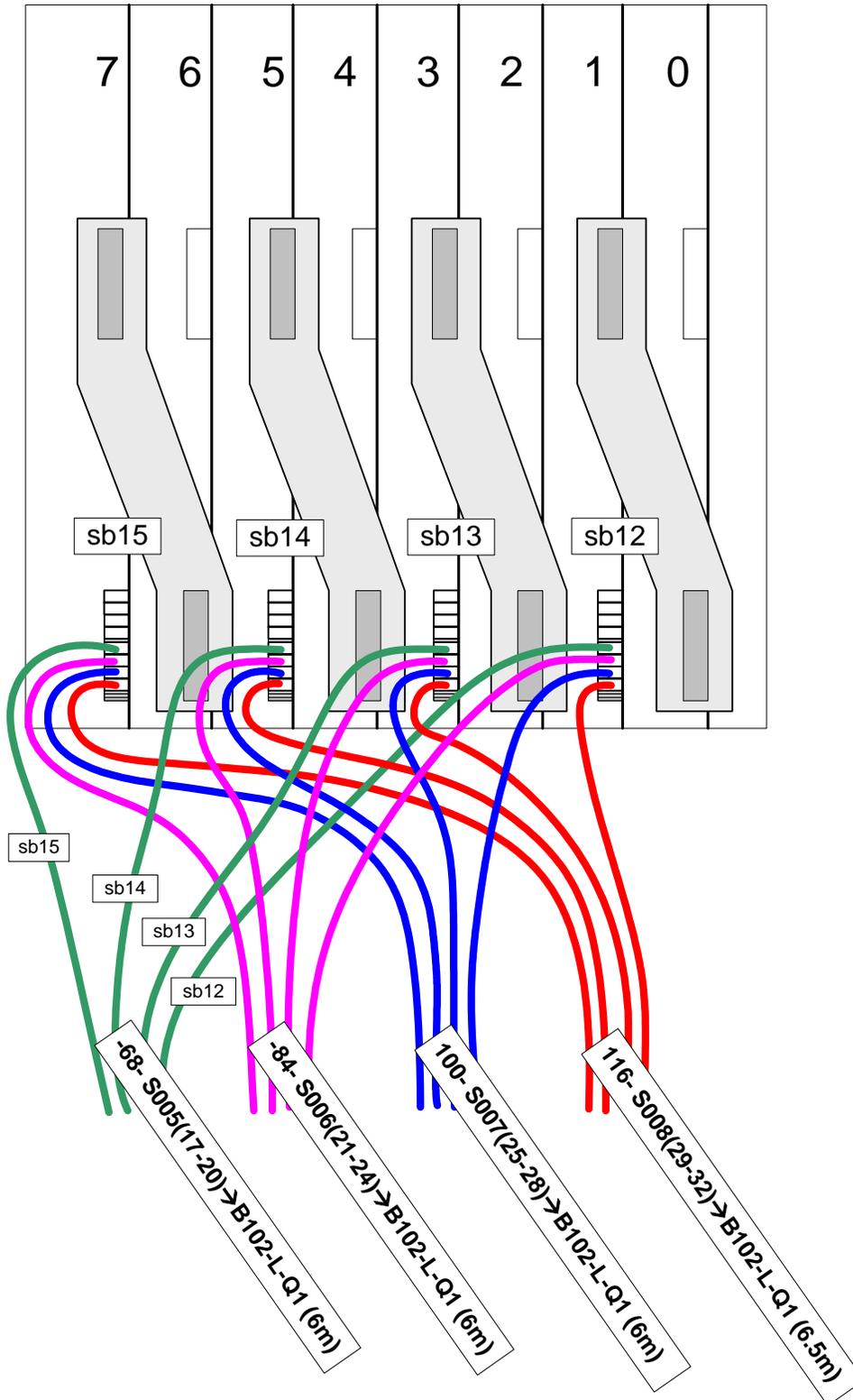
# B102:Q1 - Top/Upper Crate: sb8-11, stations 17-32



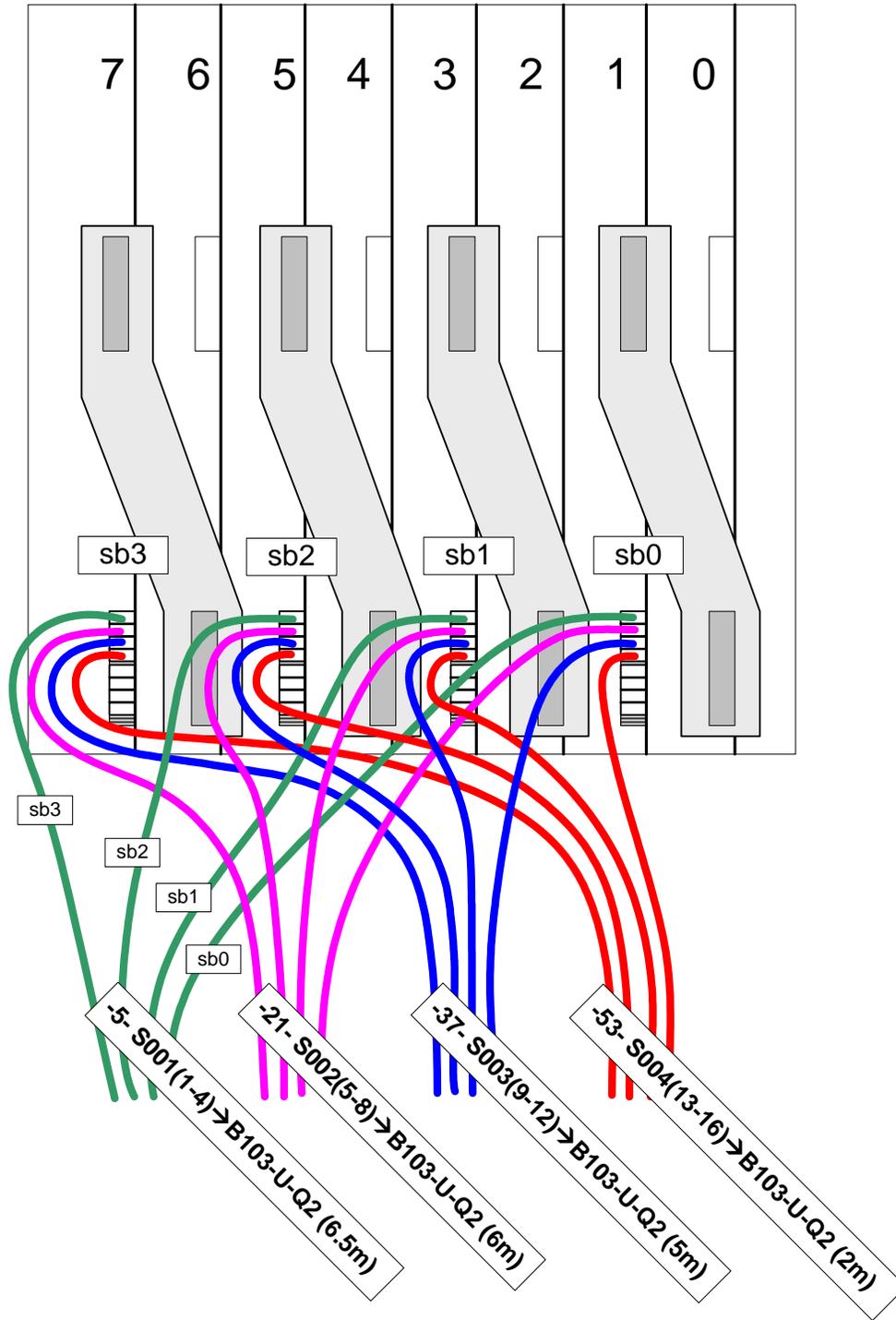
# B102:Q1 - Bottom/Lower Crate: sb12-15, stations 1-16



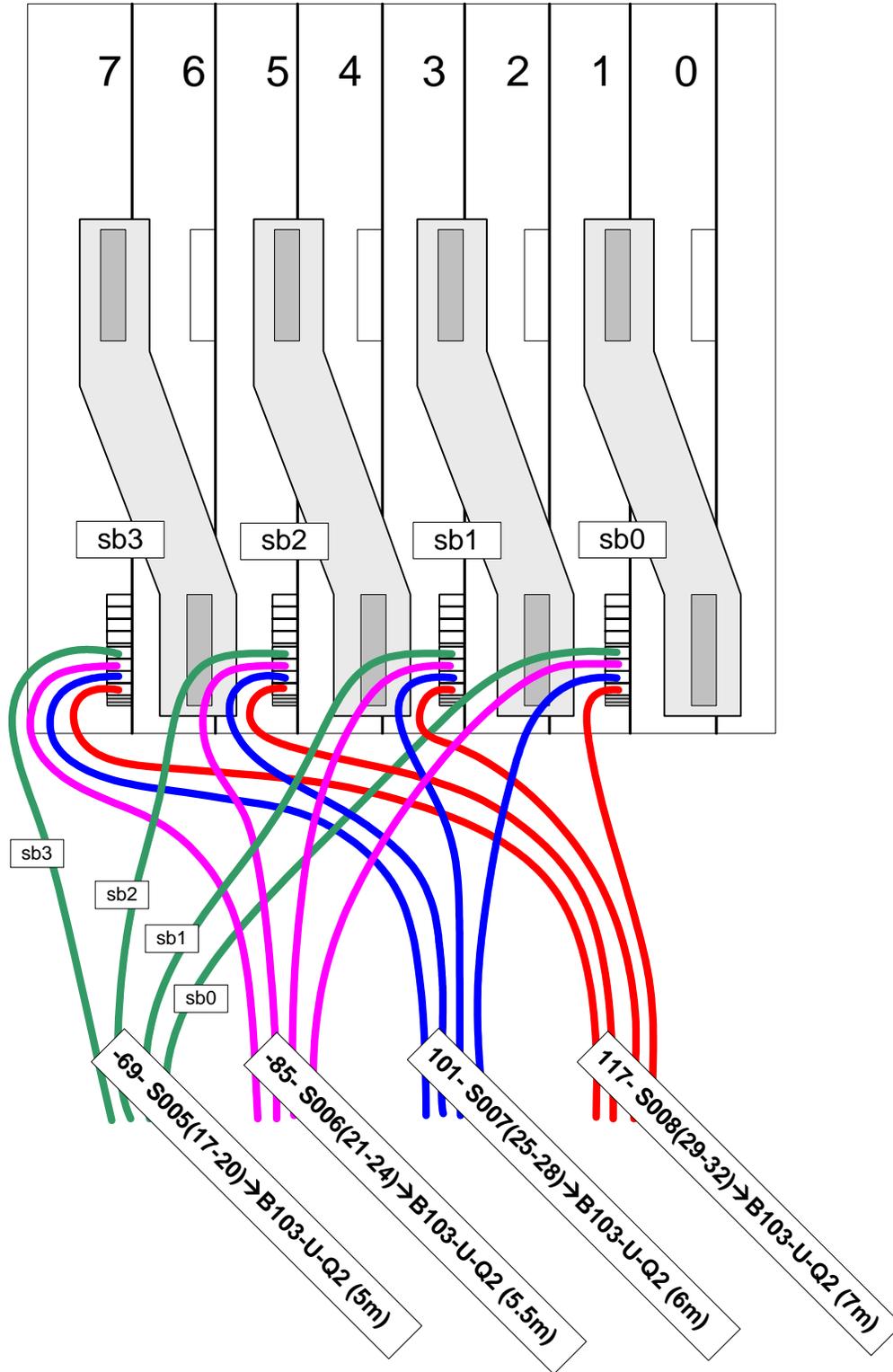
# B102:Q1 - Bottom/Lower Crate: sb12-15, stations 17-32



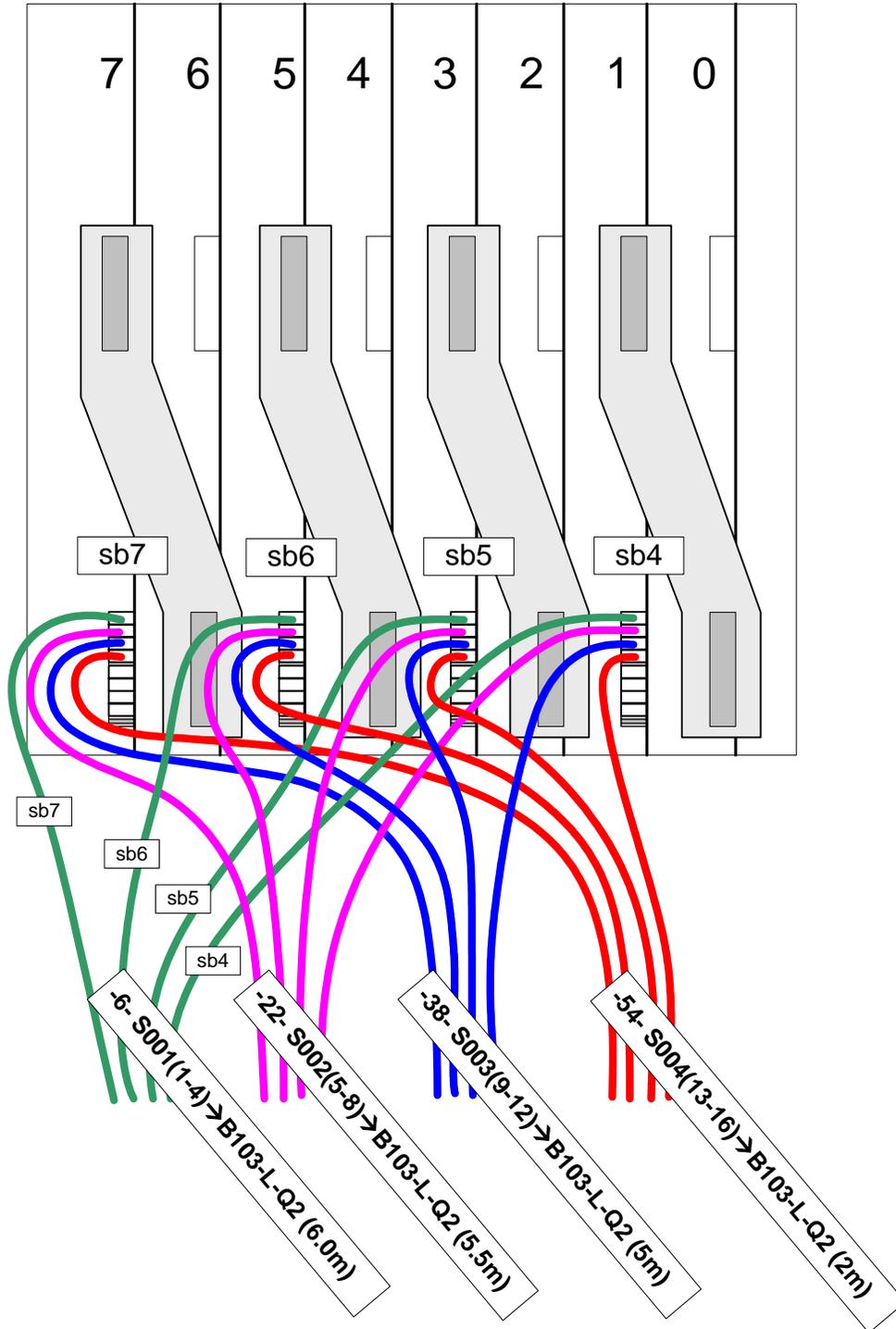
# B103:Q2 - Top/Upper Crate: sb0-3, stations 1-16



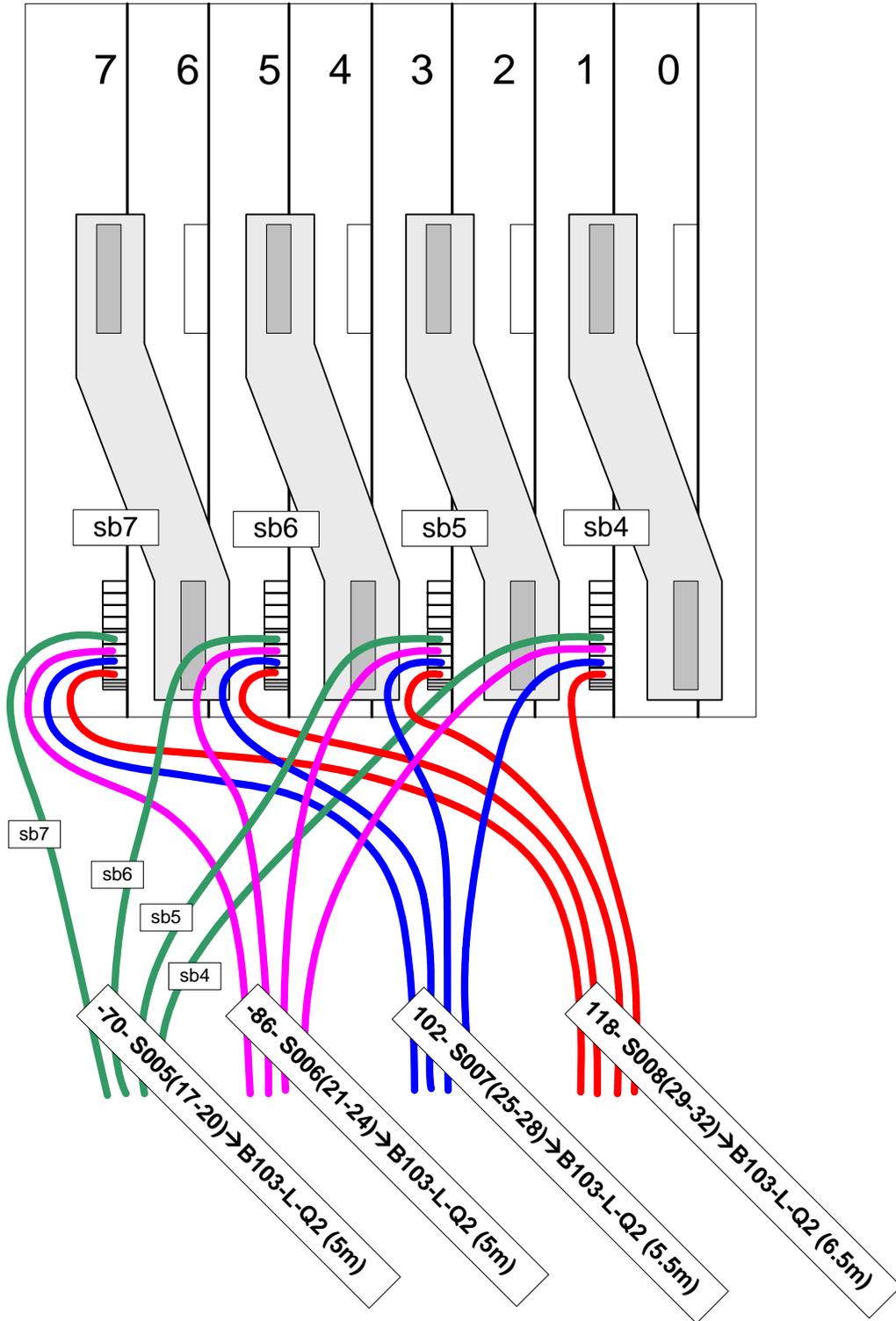
# B103:Q2 - Top/Upper Crate: sb0-3, stations 17-32



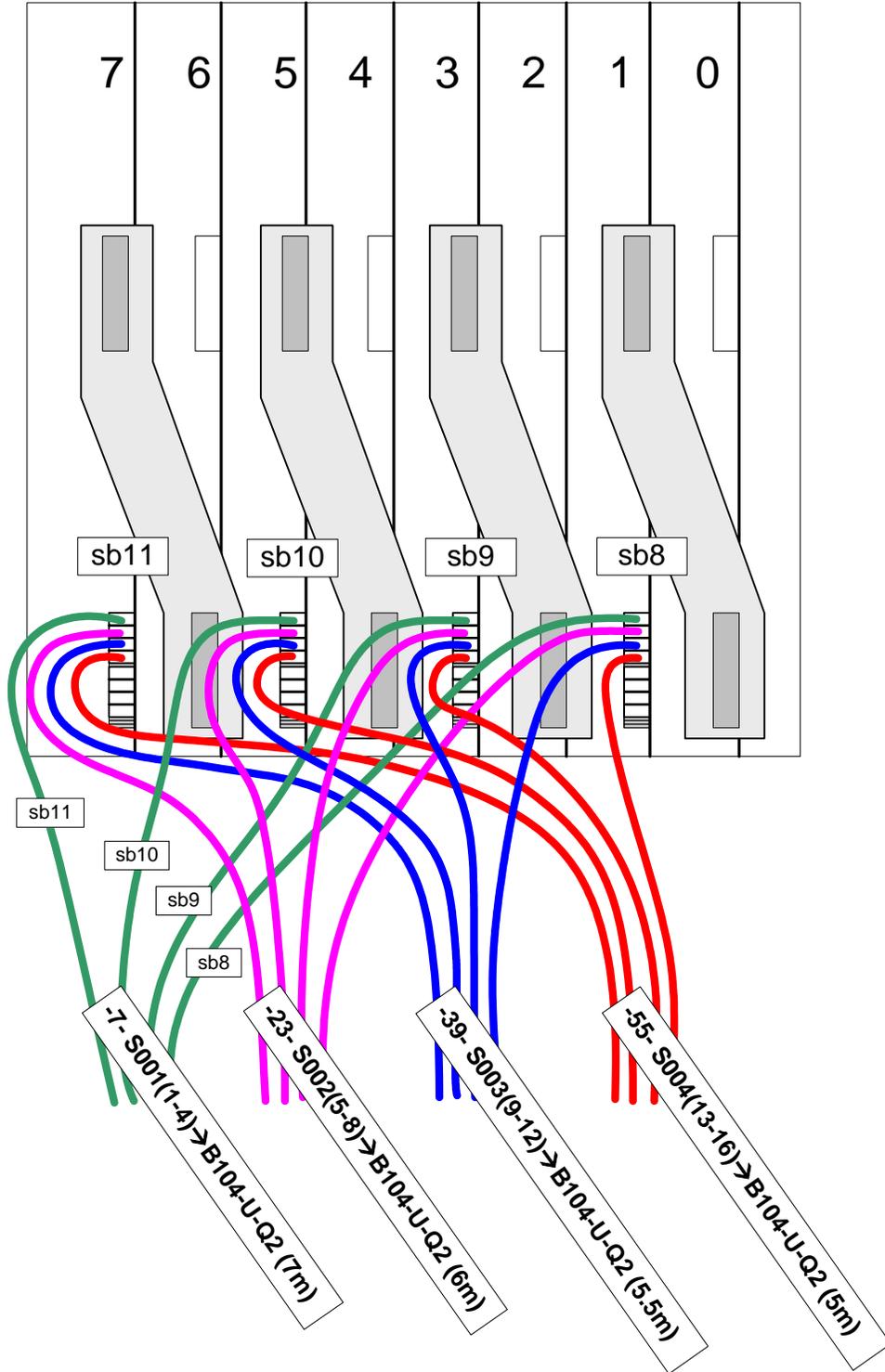
# B103:Q2 - Bottom/Lower Crate: sb4-7, stations 1-16



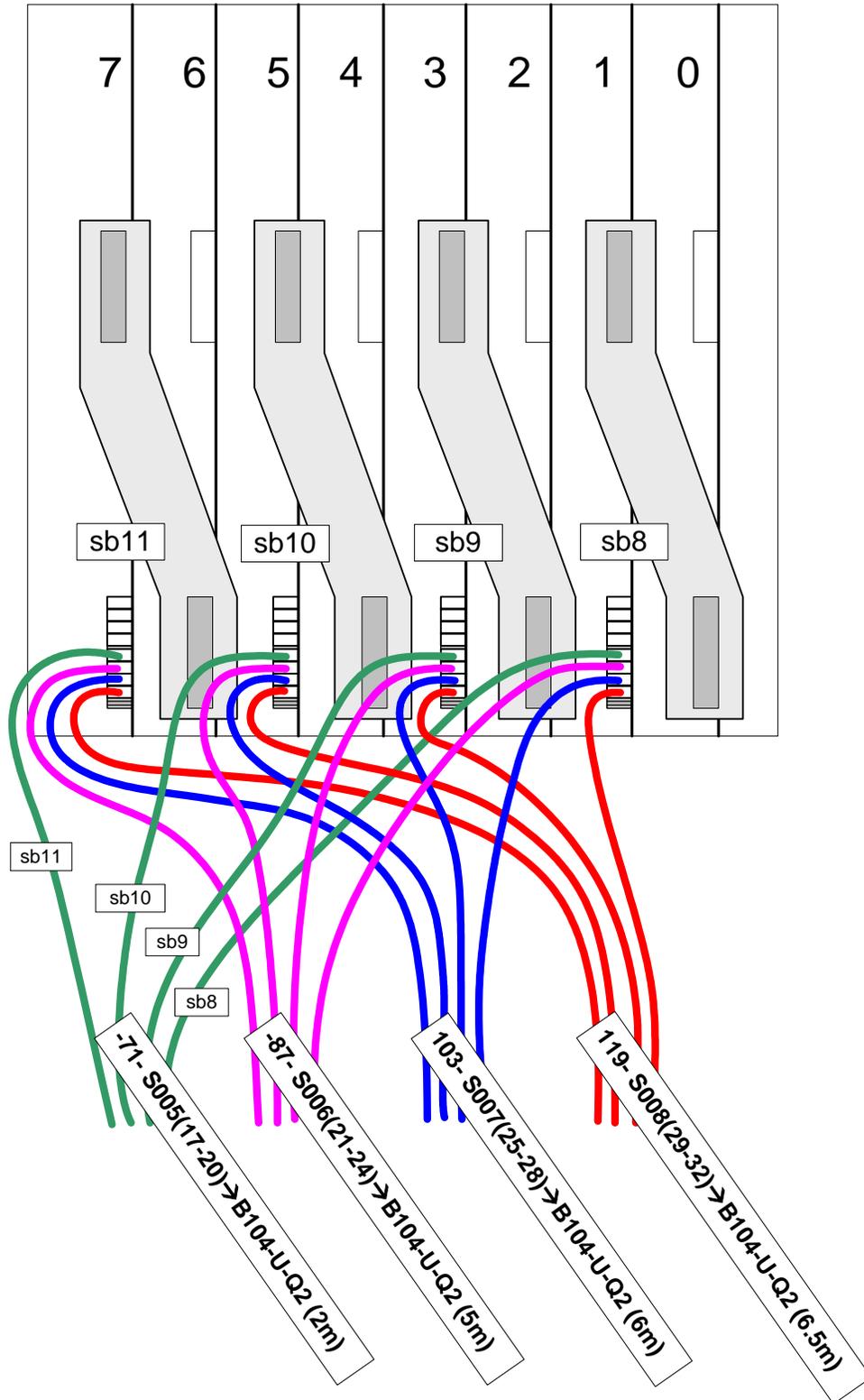
# B103:Q2 - Bottom/Lower Crate: sb4-7, stations 17-32



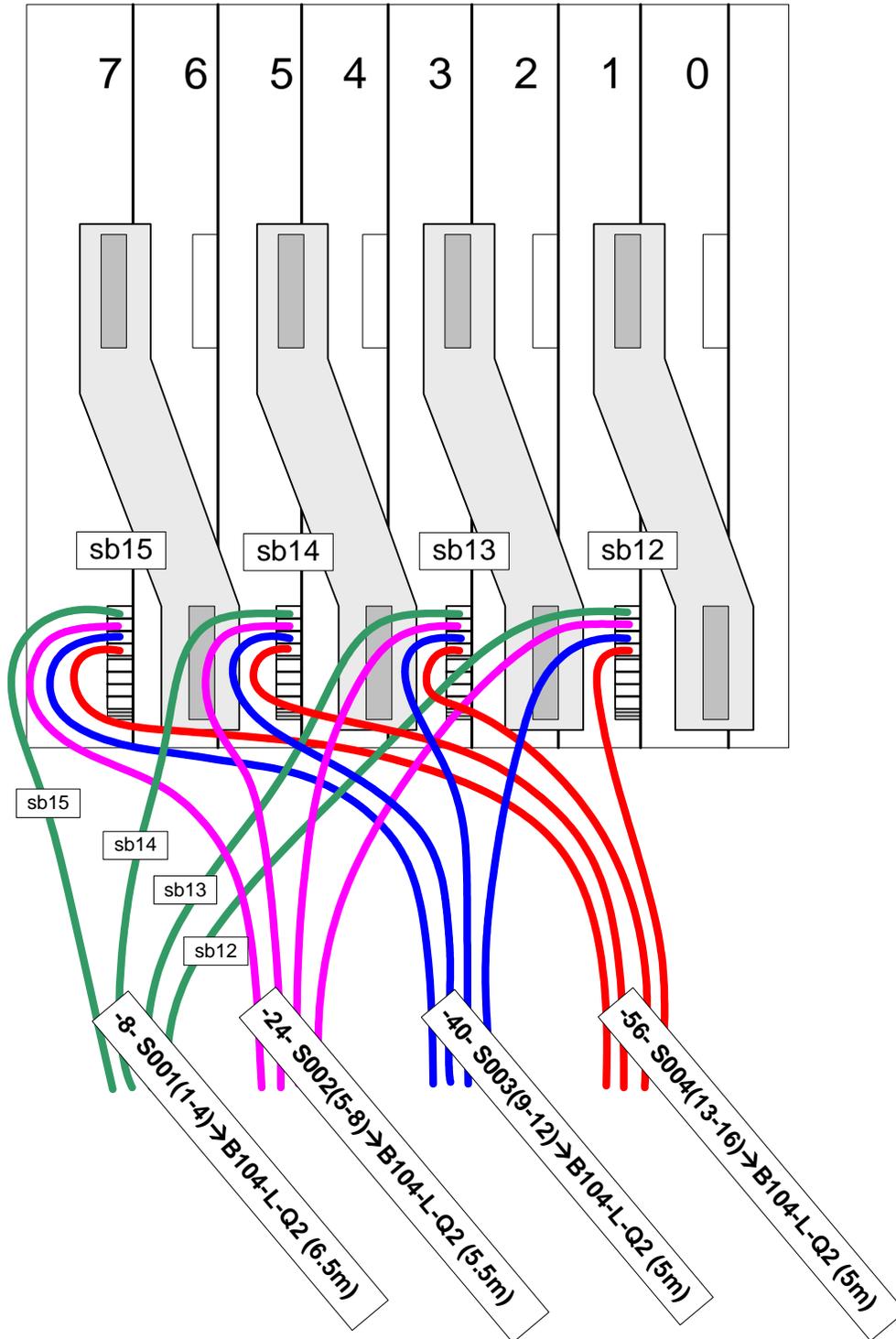
# B104:Q2 - Top/Upper Crate: sb8-11, stations 1-16



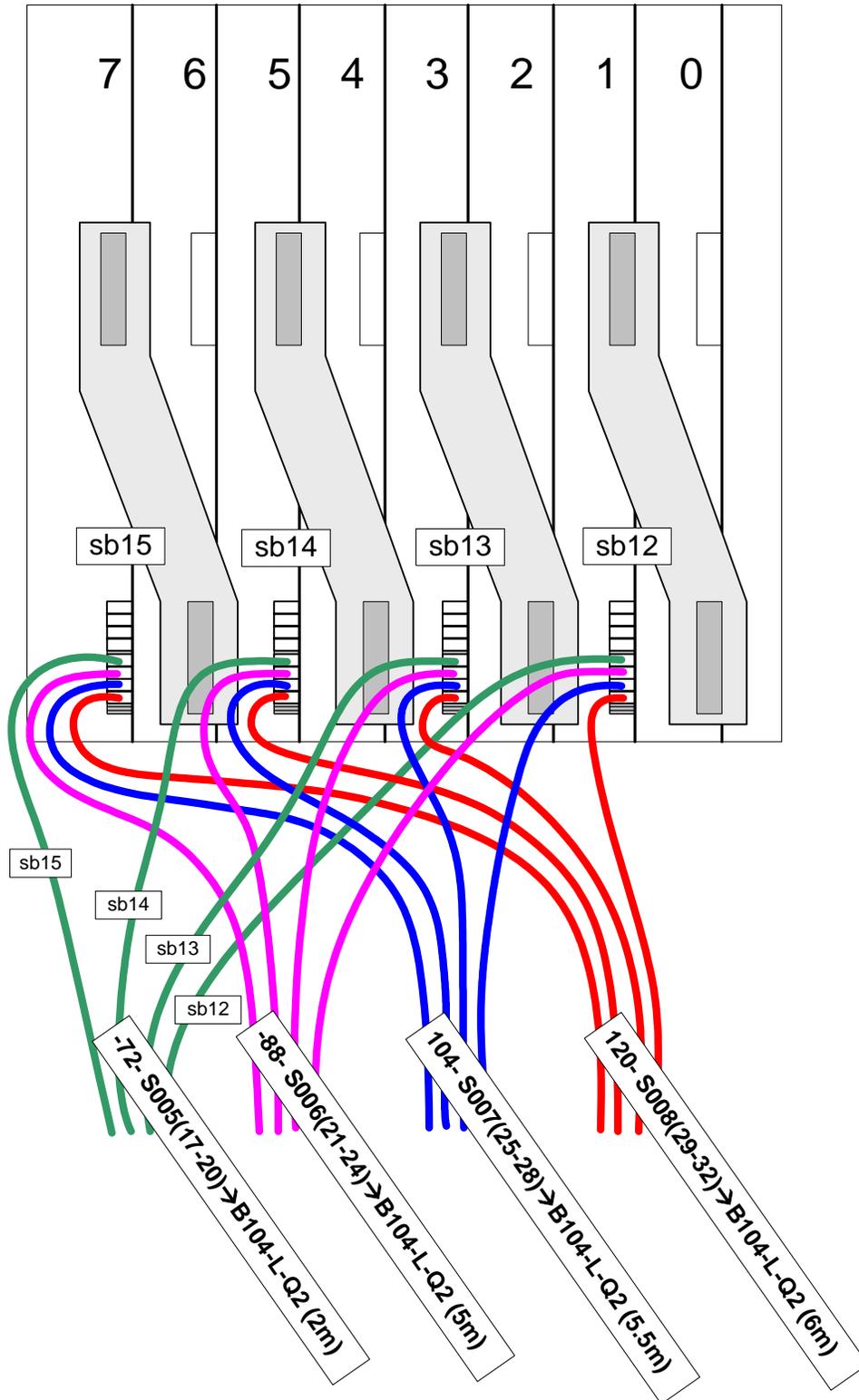
# B104:Q2 - Top/Upper Crate: sb8-11, stations 17-32



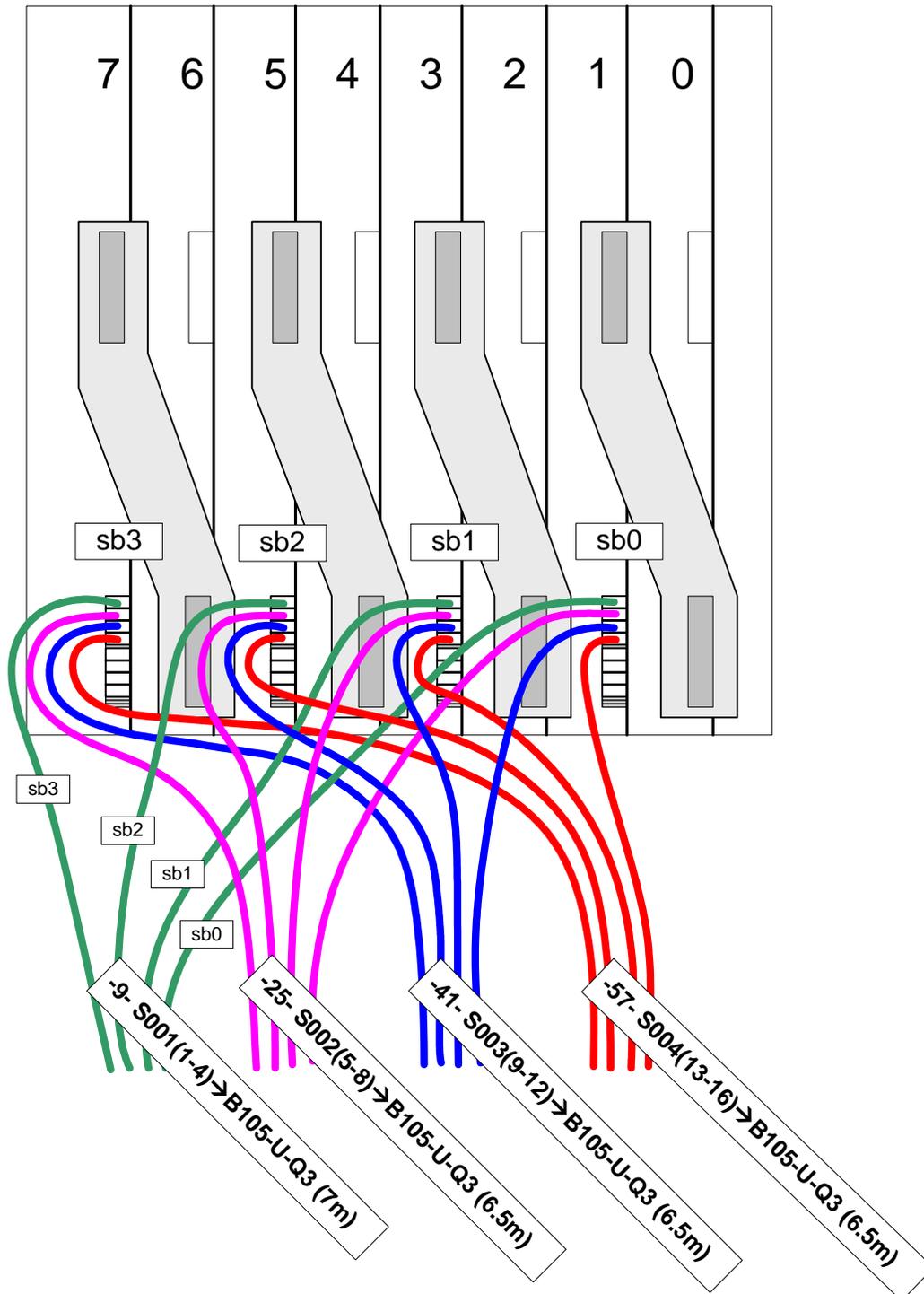
# B104:Q2 - Bottom/Lower Crate: sb12-15, stations 1-16



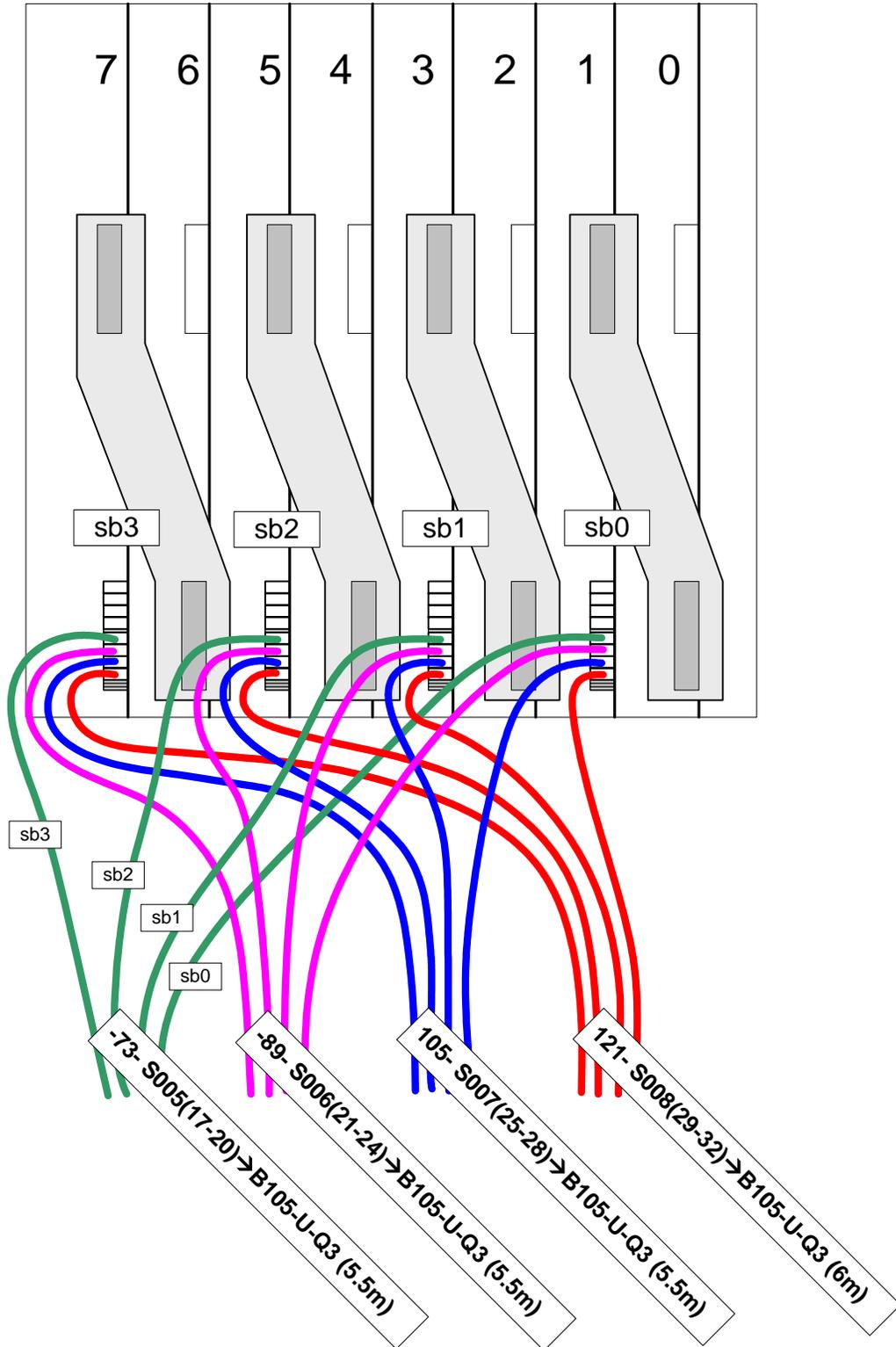
# B104:Q2 - Bottom/Lower Crate: sb12-15, stations 17-32



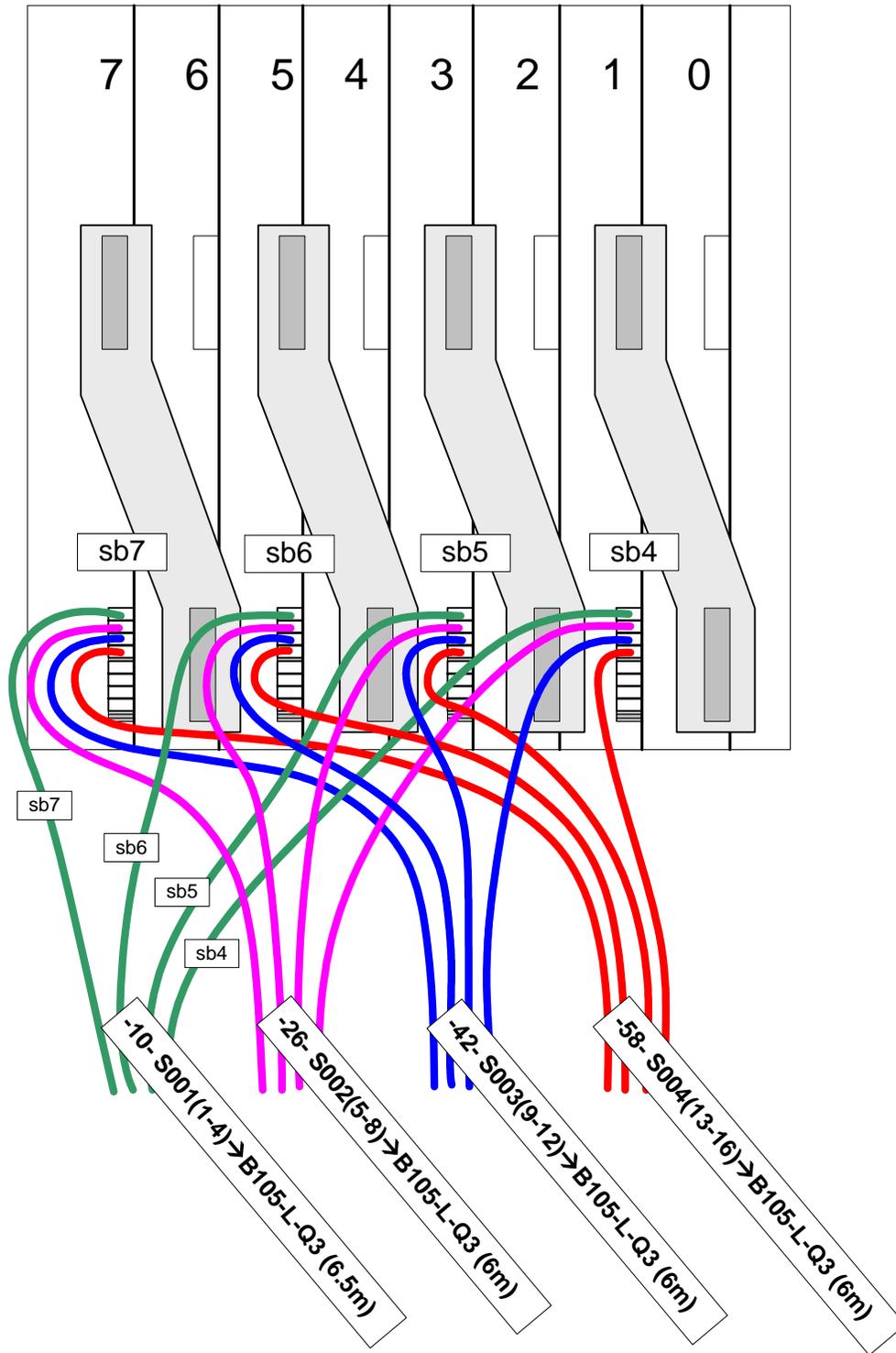
# B105:Q3 - Top/Upper Crate: sb0-3, stations 1-16



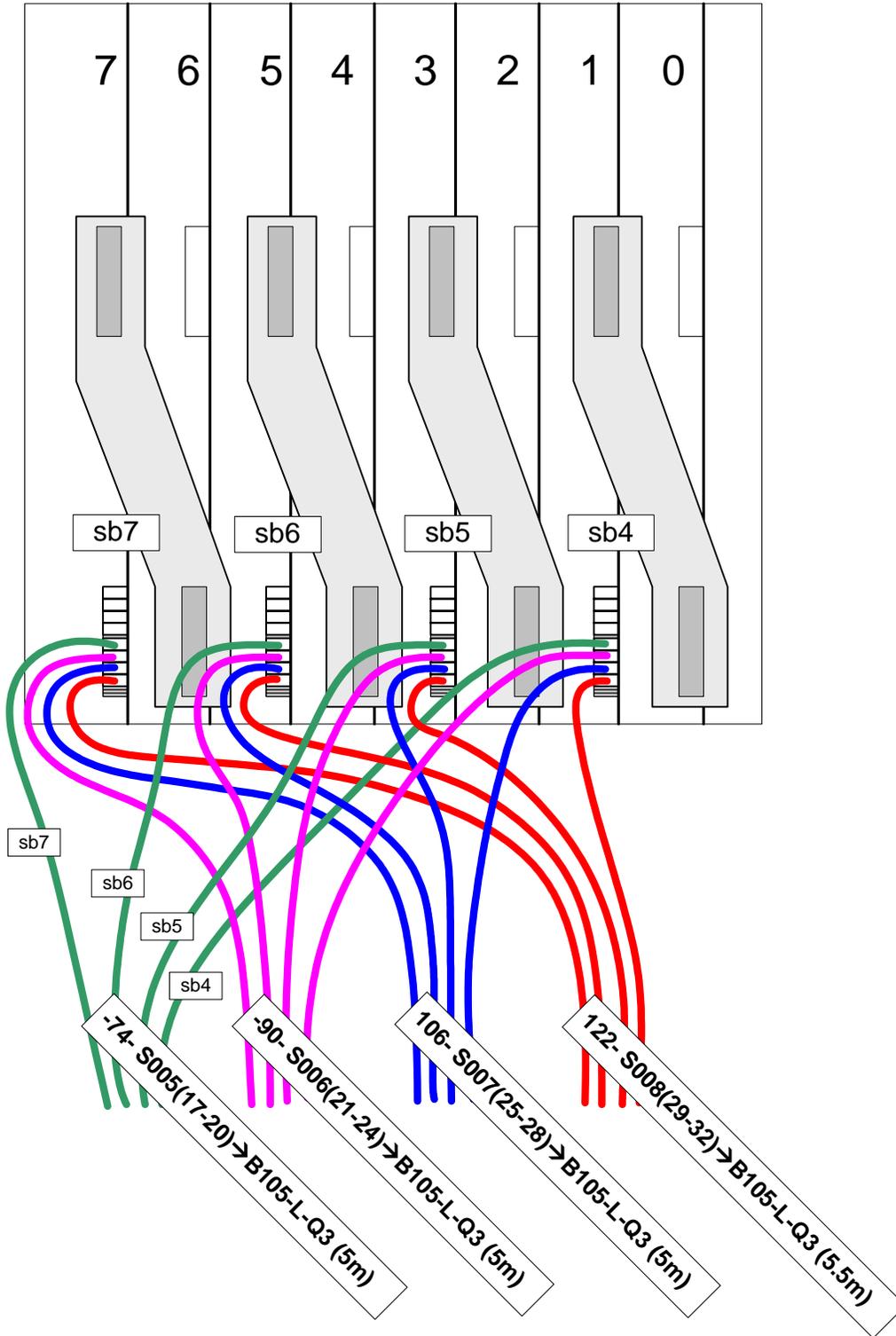
# B105:Q3 - Top/Upper Crate: sb0-3, stations 17-32



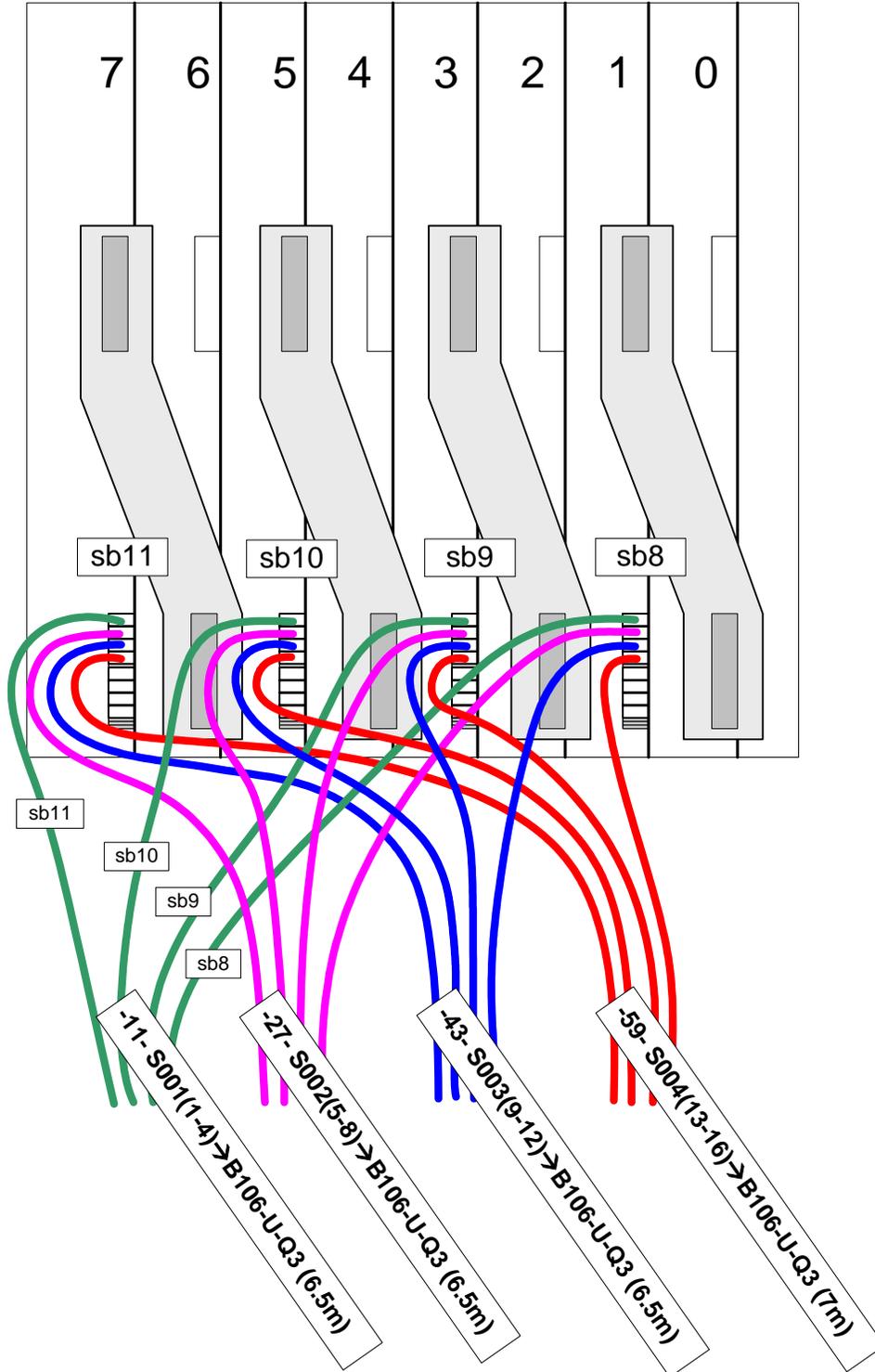
# B105:Q3 - Bottom/Lower Crate: sb4-7, stations 1-16



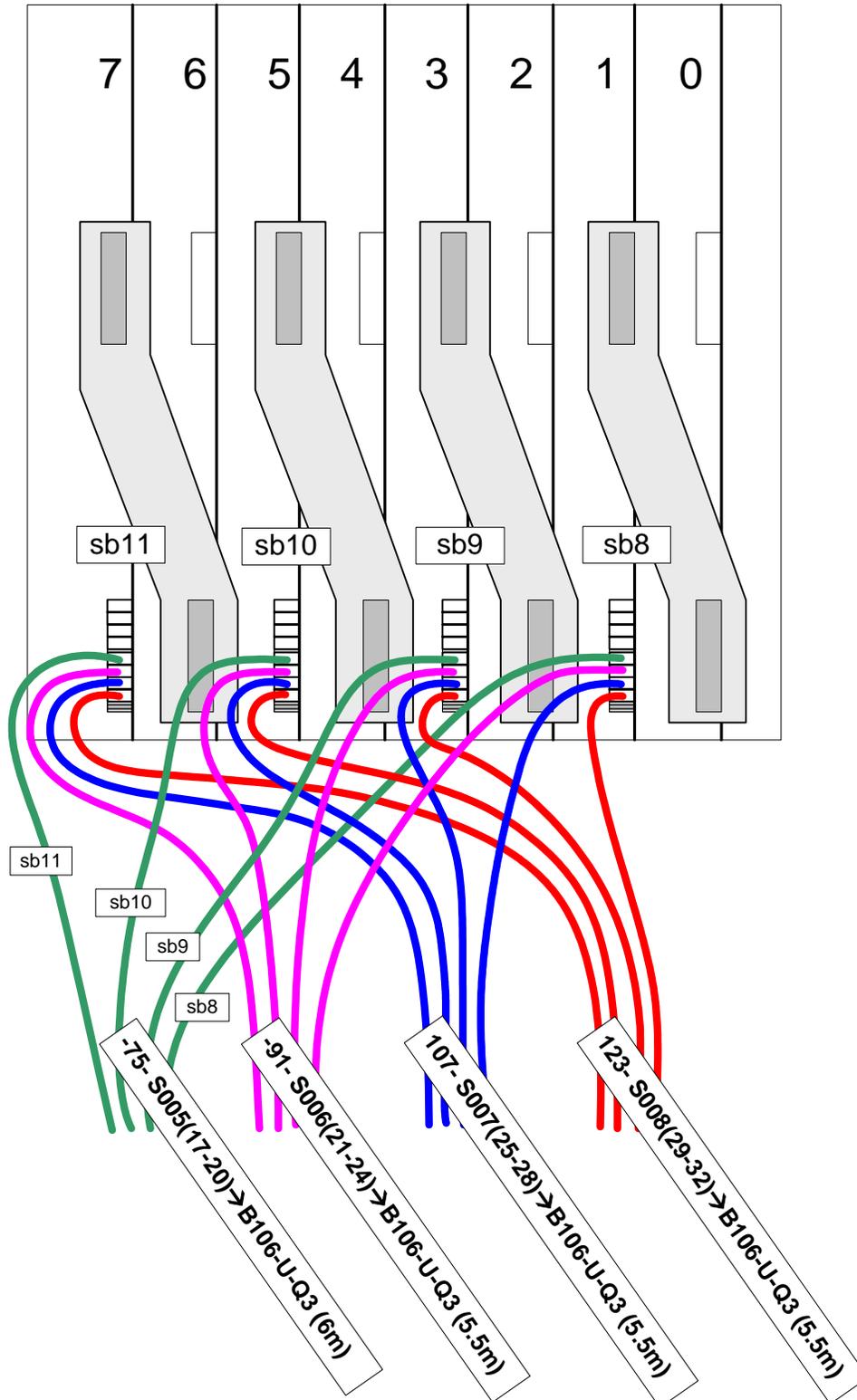
# B105:Q3 - Bottom/Lower Crate: sb4-7, stations 17-32



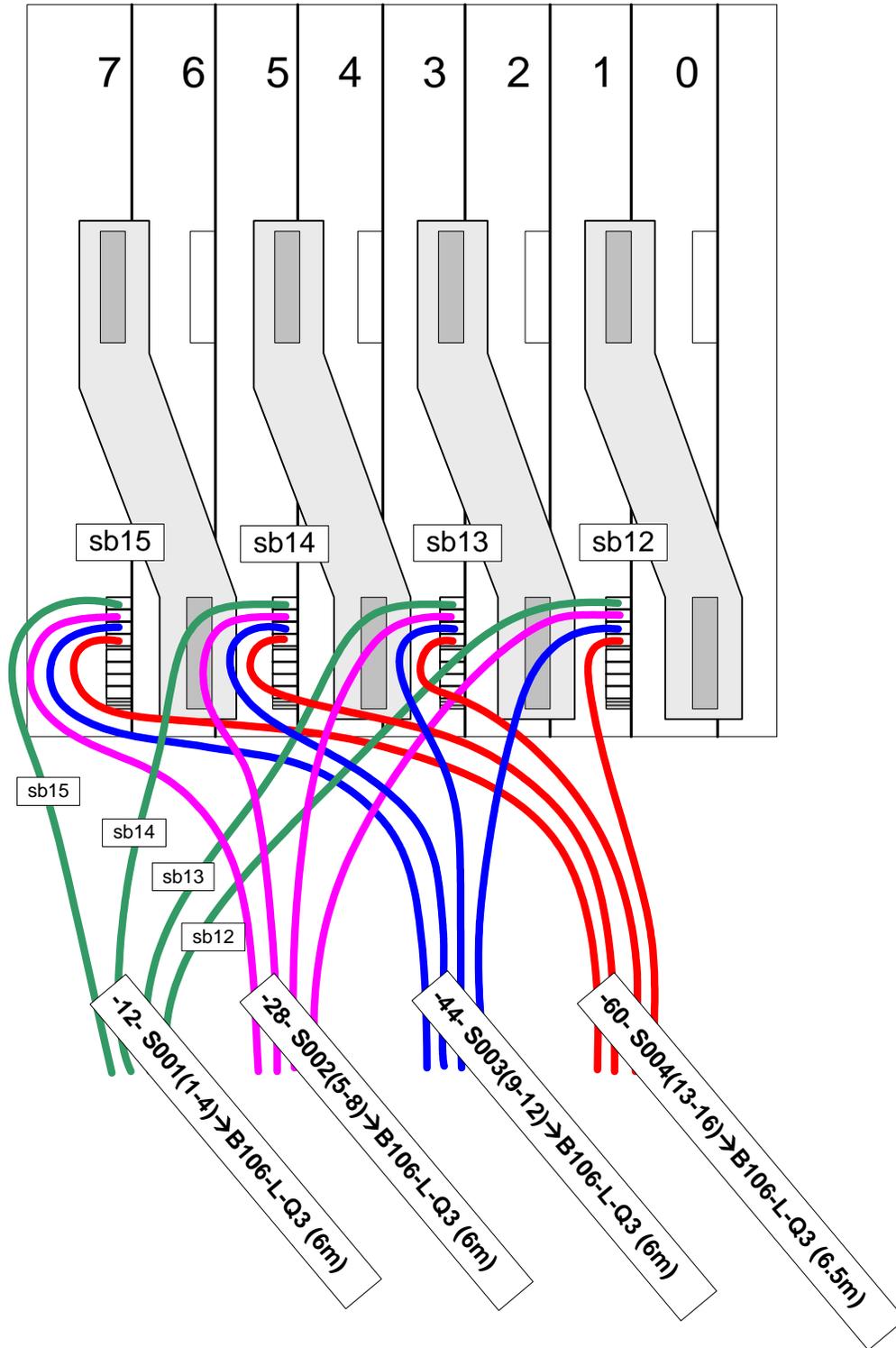
# B106:Q3 - Top/Upper Crate: sb8-11, stations 1-16



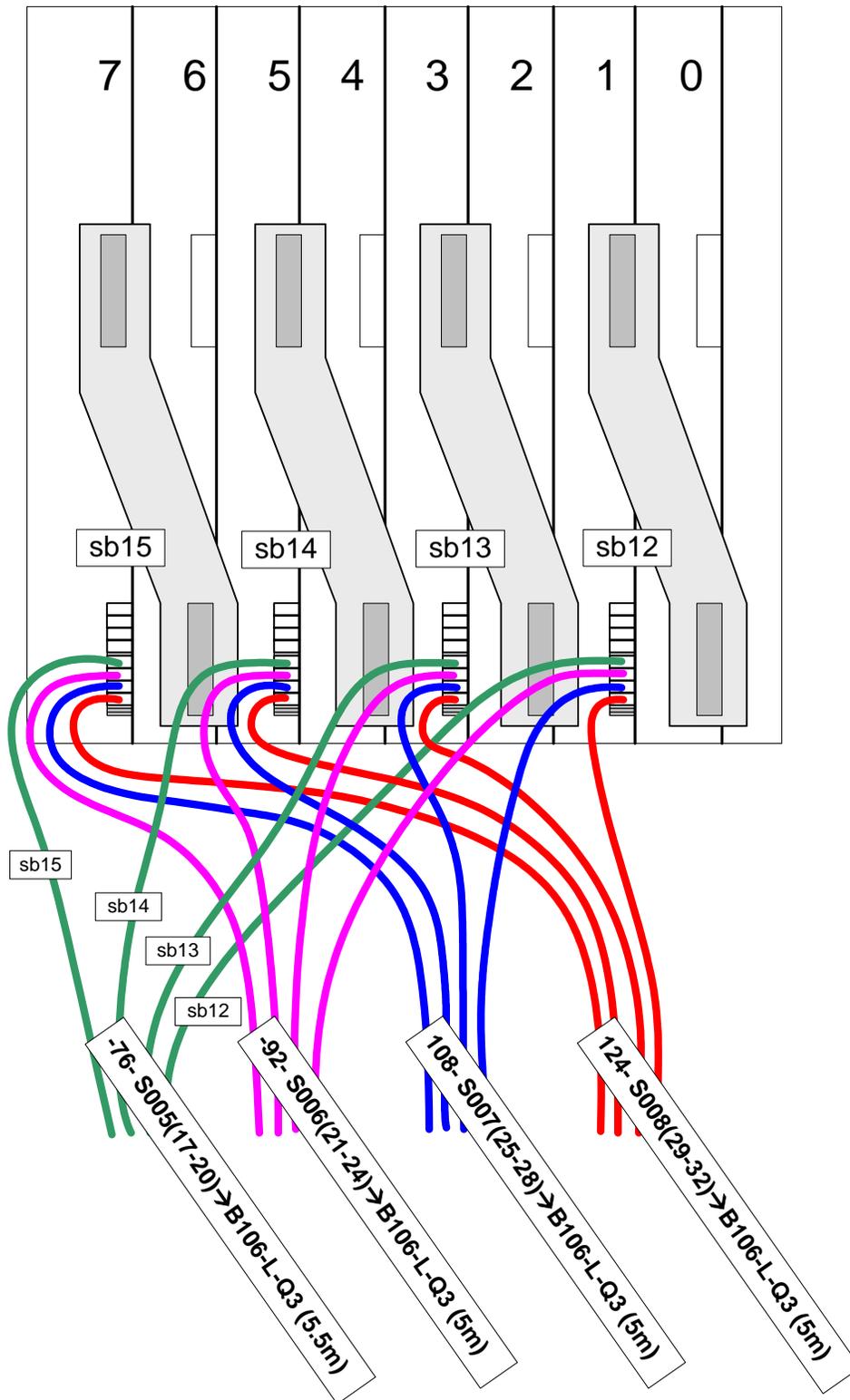
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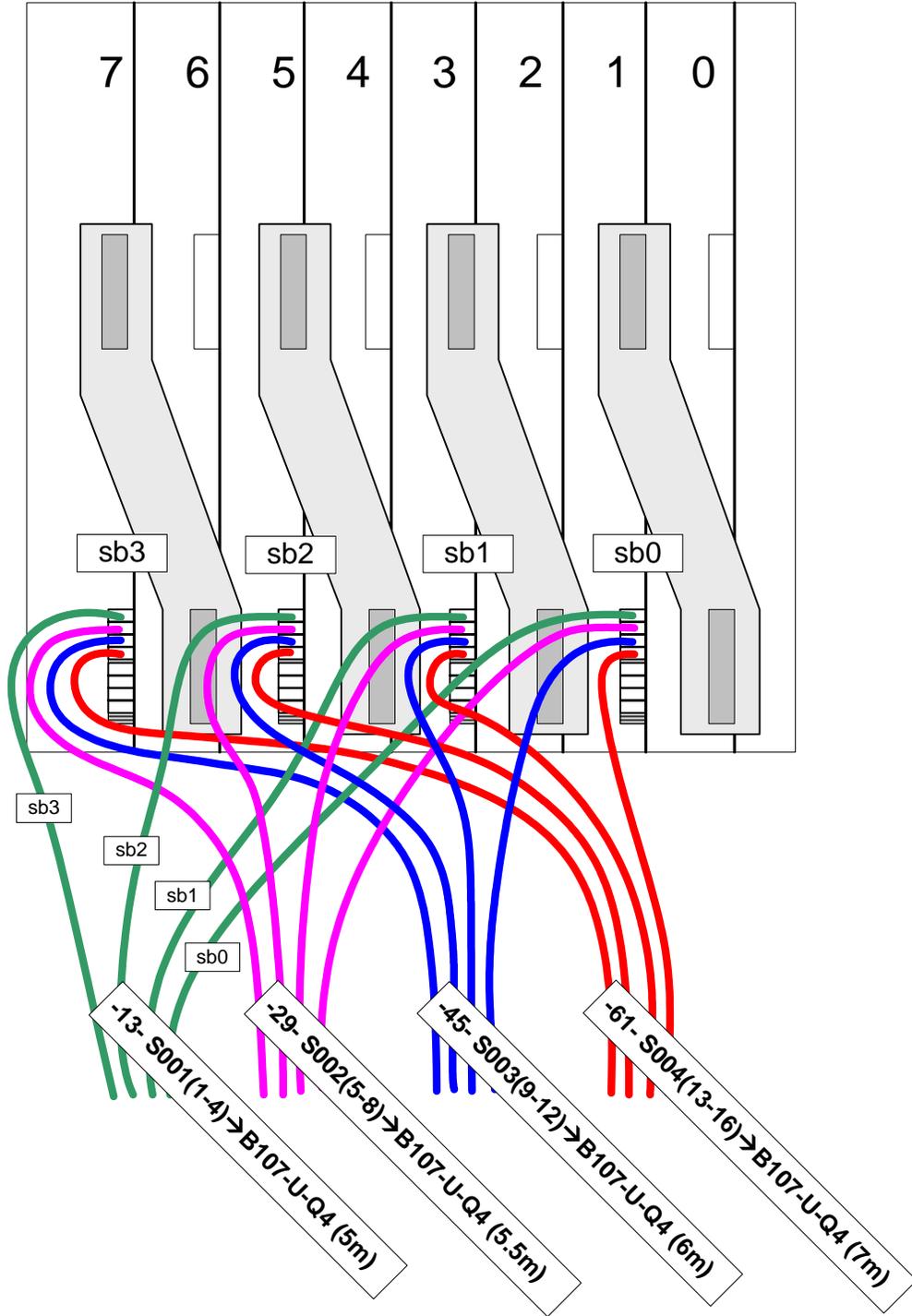
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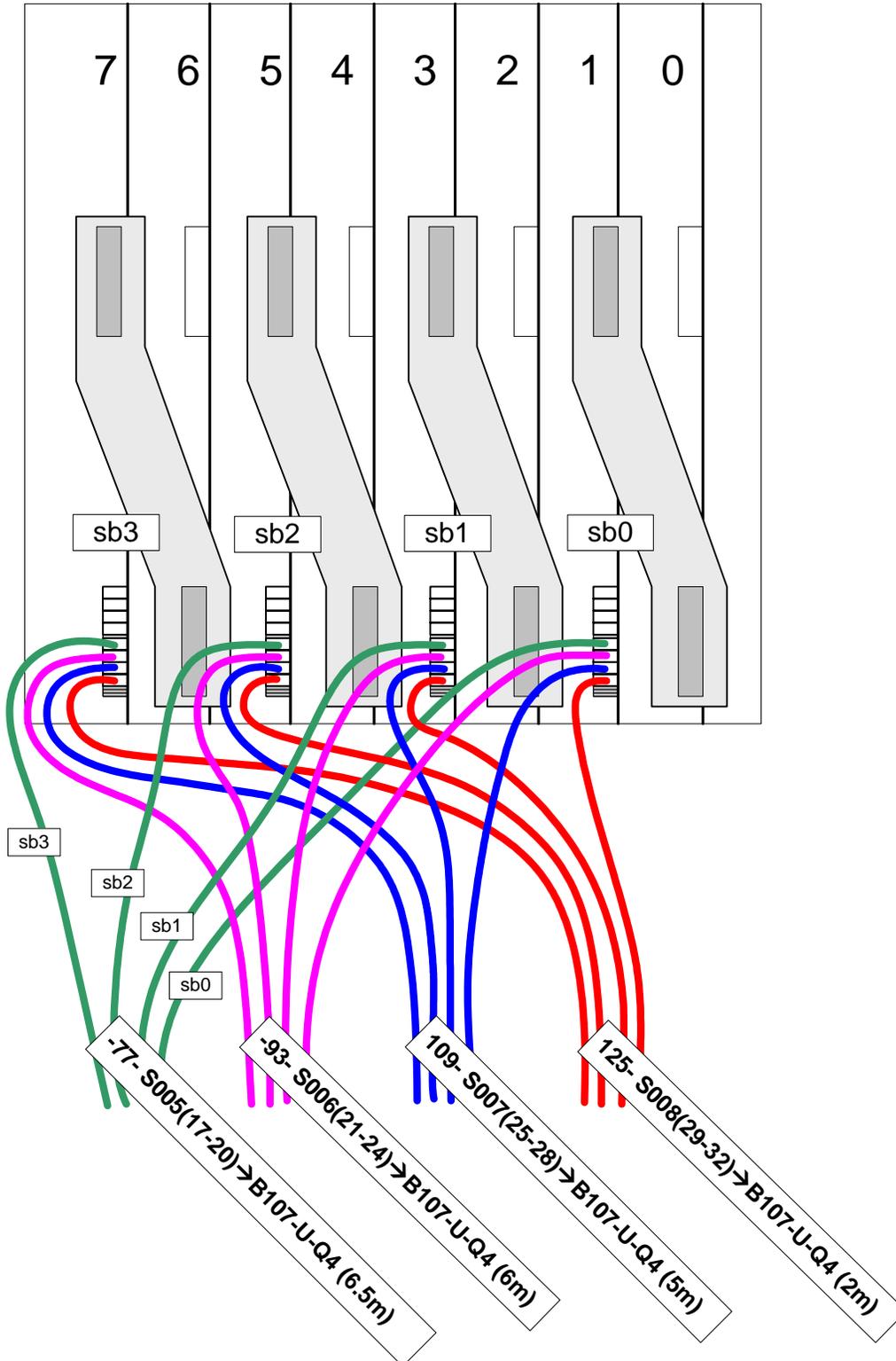
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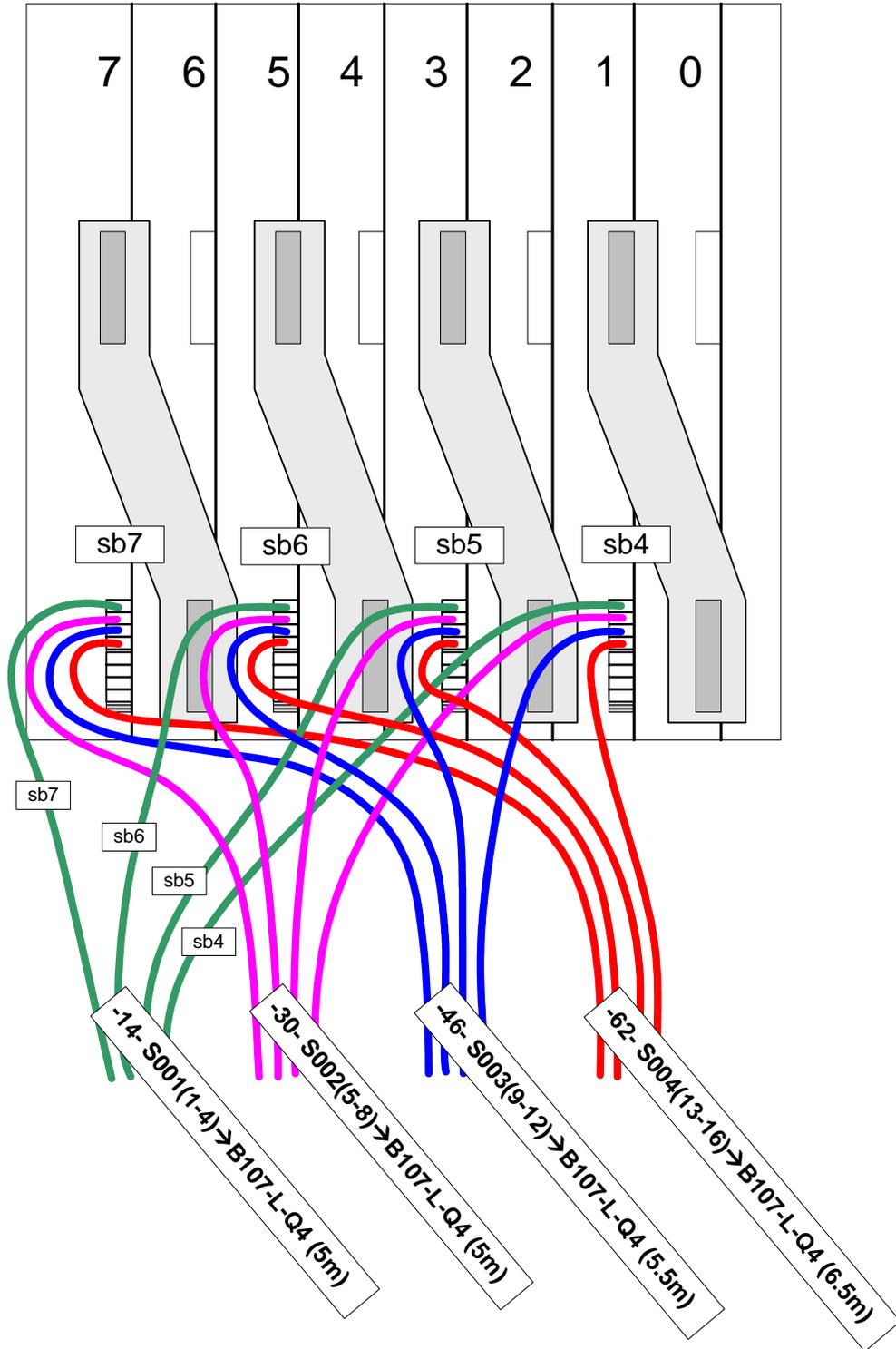
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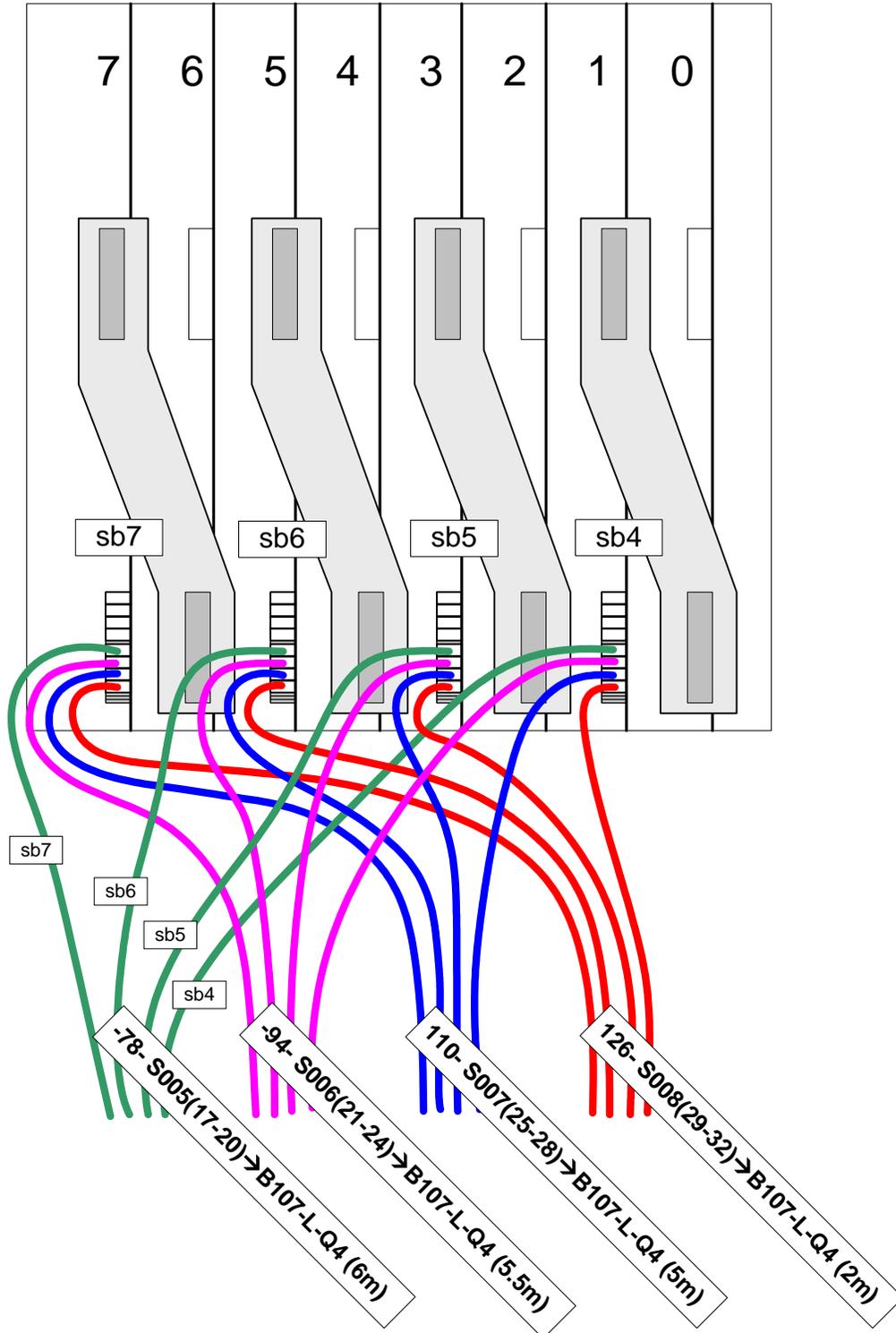
# B107:Q4 - Top/Upper Crate: sb0-3, stations 17-32



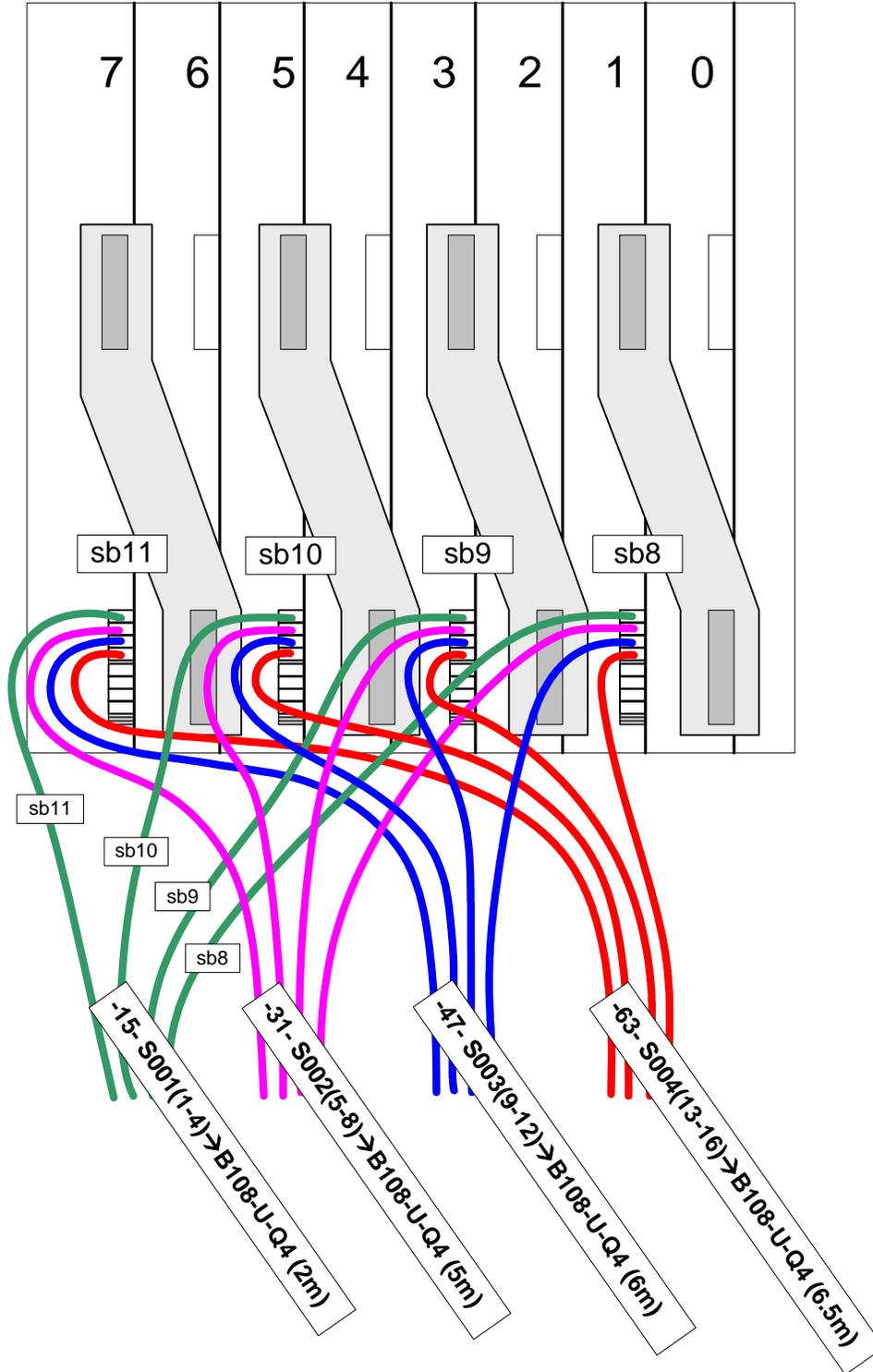
# B107:Q4 - Bottom/Lower Crate: sb4-7, stations 1-16



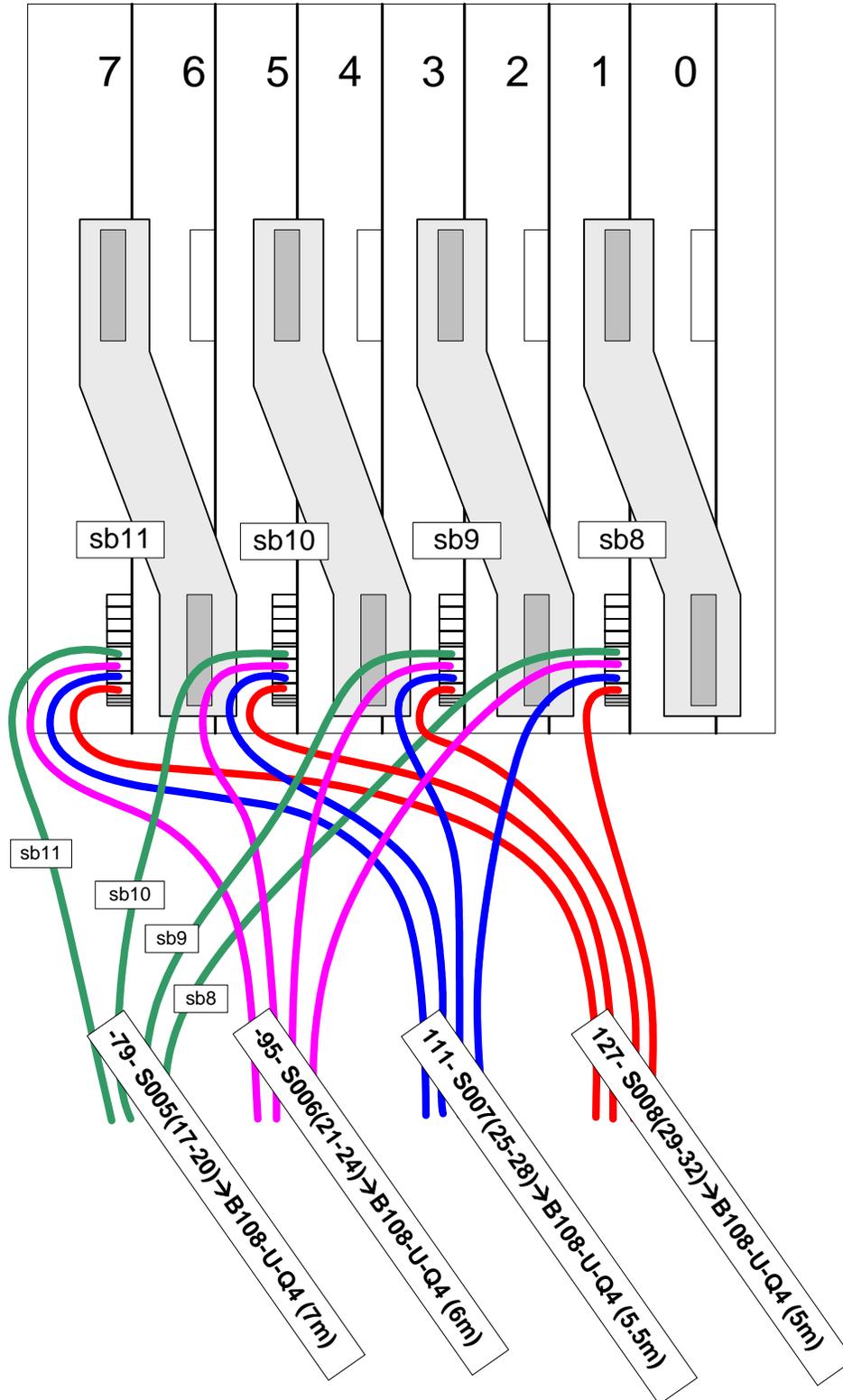
# B107:Q4 - Bottom/Lower Crate: sb4-7, stations 17-32



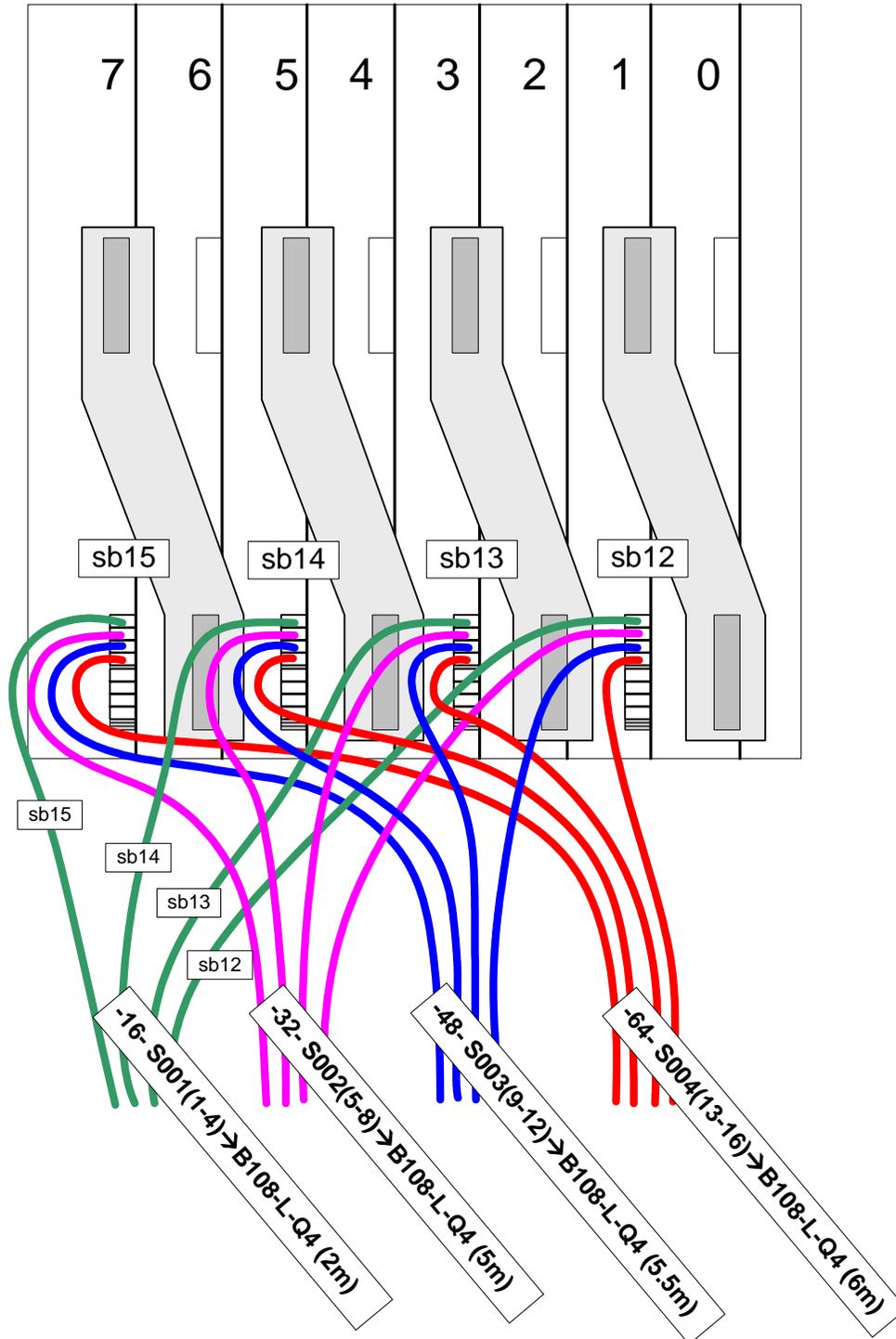
# B108:Q4 - Top/Upper Crate: sb8-11, stations 1-16



# B108:Q4 - Top/Upper Crate: sb8-11, stations 17-32



# B108:Q4 - Bottom/Lower Crate: sb12-15, stations 1-16



# B108:Q4 - Bottom/Lower Crate: sb12-15, stations 17-32

