

Server Separation—Avaya S8700 Media Server



Overview of Server Separation

This feature provides for the geographical separation of Avaya™ S8700 Media Servers to improve their survivability. A maximum distance, using single mode fiber, of 10-kilometers separation is supported. This maximum is dictated by the transceiver power budget available on the DAJ1 board (fiber duplication link) in the S8700 Media Servers.

Server separation is applicable to media servers in the Avaya™ S8700 Media Server with MCC1 or SCC1 Media Gateway (S8700 Multi-Connect) as well as Avaya™ S8700 Media Server with G600 Media Gateway (S8700 IP Connect).

S8700 Media Server Separation in its basic configuration is relatively straightforward to implement. However, variations of the basic configuration introduce some complex issues and concerns. Each server separation design must be reviewed by the Avaya Technology And Consulting (ATAC) for accuracy and technical feasibility. Once reviewed, the design details are valuable during project implementation.

Installation Considerations

Extending the distance between media servers does not change how they work. Configuration of the media servers and the other server complex elements is similar to a standard collocated media server complex installation. However, due to the customers network topology, the media servers may be configured to use different data subnets for their connection to the customer LAN. If the servers are connected to different data subnets the *Active Server IP Address* and *Active Server Host Name* cannot be used.

An additional INADS line may be required if the media servers are on different data subnets or, if they are on the same subnet, the physical distance between them precludes bridging one INADS line onto both modems.

Depending on local practice it may be prudent to stage both media servers at one location, configure them and verify their operation when collocated. Then one of the servers could be moved to the distant location and the additional hardware (media converters, fiber optic cable, etc.) added.

CAUTION:

Be aware that if the servers are configured at one location, on the same data subnet, the one that moves may need to be re configured to utilize a different subnet at the distant location.

See the job aid “Pre-Installation Network Planning Forms--S8700 Media Server” for further details about what data must be collected and configured for separated S8700 Media Servers.

Additional component parts that may be required

Separated server operation may require that media converters, data switches, fiber optic and CAT5 Ethernet cables be added to the configuration. Another important component of the separated server feature is customer-supplied fiber optic cable between server locations. With Single-mode fiber Avaya will support up to 10 kilometer separation of servers, and with multi-mode fiber, up to a maximum distance of 2 kilometers. Refer to "[Typical Configurations](#)" (page 3) for a depiction of the parts involved.

Media Converters

These devices provide conversion between Universal Twisted Pair (UTP) Ethernet networks and fiber optic networks. Multi-mode converters can be ordered with either ST- or SC-style connectors. Single-mode converters are equipped with SC connectors.

Fiber optic cables

A crossover fiber optic cable is supplied with collocated S8700 Media Servers to facilitate the connection of the fiber optic duplication link. The connection between separated servers still needs to provide a crossover but only at one of the media servers involved. A straight-through fiber optic cable is needed at one of the media servers to avoid placing a double crossover in the link.

Category 5 Ethernet cables

A crossover CAT5 cable is supplied with collocated S8700 Media Servers to provide the Ethernet duplication link between servers. The equivalent connection between separated servers still needs to provide a crossover but care must be taken to not provide a double crossover. In addition to crossover cables the media converters are capable of providing a crossover. Careful consideration must be taken to only provide one crossover component in the duplication link.

Additional straight-through CAT5 cables are required between data switches and media converters for the Layer 2 trunk connections.

Data switches

With the S8700 Multi-Connect configuration, data switches typically located with each separated S8700 Media Server. This allows Layer 2 trunks to be implemented between the data switches within a given control network (CNA or CNB). These data switches may be equipped with GigaBit Interface Converters (GBIC) expansion modules to facilitate the Layer 2 trunks between the data switches.

Typical Configurations

Included here are five typical configurations. Four of these configurations depict a critical reliability configuration of the S8700 Multi-Connect and one addresses a duplex reliability configuration of the S8700 IP Connect. There are many other variations of these configurations that could be implemented.

Table 1. Legend for figure abbreviations

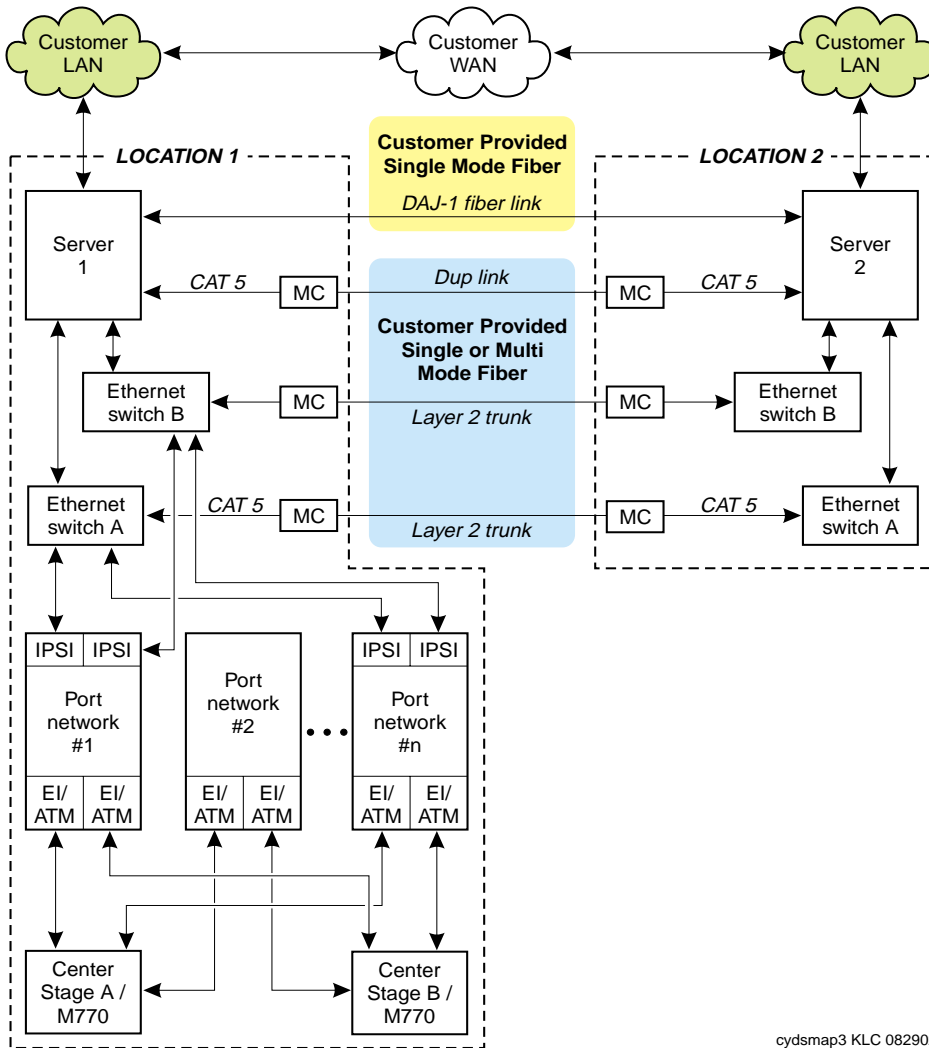
Abbreviation	Description
ATM	Asynchronous Transfer Mode
CSS	Center Stage Switch
EI	Expansion Interface
GBIC	GigaBit Interface Converter
IPSI	IP Server Interface
LAN	Local Area Network
M770	ATM Switch (Customer may supply)
MC	Media Converter
PNC	Port Network Connectivity
SNC	Switch Node Carrier
WAN	Wide Area Network

Basic separation—Multi-Connect—critical reliability configuration

Figure 1 represents media servers that are geographically separated and port networks located with media server 1. Media converters and customer-provided, single-mode fiber are used to extend the Ethernet duplication link between the servers. Customer-provided, single-mode fiber is used to extend the fiber duplication link (memory shadowing) between media servers. Data switches for both Control Network A and B are provided at each media server location. Layer 2 trunks are provided between the control network data switches. Transport for the Ethernet Layer 2 trunks is provided by media converters and customer-provided, single-mode fiber.

NOTE:
Except for the duplex CSS, this figure applies to high reliability configurations.

Figure 1. Basic separation—Multi-Connect--critical reliability configuration



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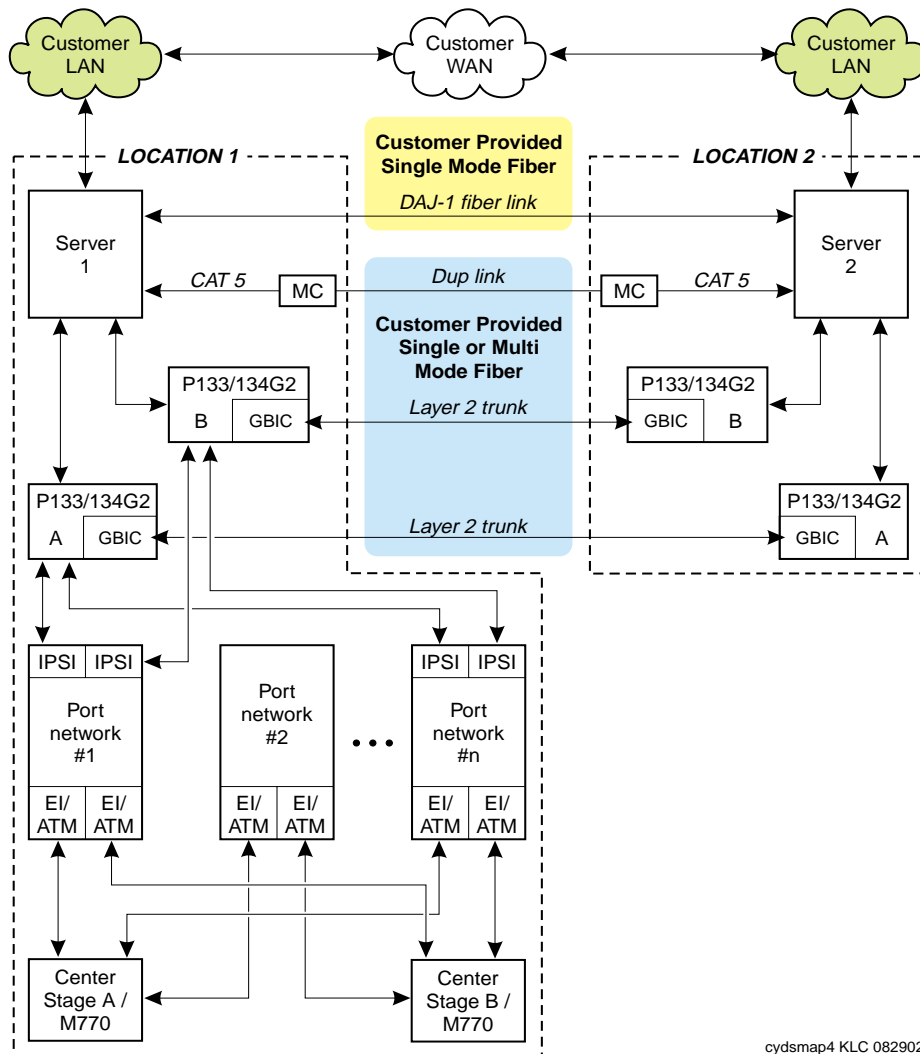
Basic separation—Multi-Connect--critical reliability configuration

Figure 2 represents media servers that are geographically separated and port networks located with media server 1. Media converters and customer-provided, single-mode fiber are used to extend the Ethernet duplication link between the servers. Customer-provided, single-mode fiber is used to extend the fiber duplication link between media servers. Data switches, equipped with GigaBit Interface Converter (GBIC) expansion modules, are provided at each location. Customer-provided, single-mode fiber connects the GBIC expansion modules to provide Layer 2 trunk connectivity between data switches.

NOTE:

Except for the duplex CSS, this figure applies to high reliability configurations.

Figure 2. Basic separation—Multi-Connect--critical reliability configuration

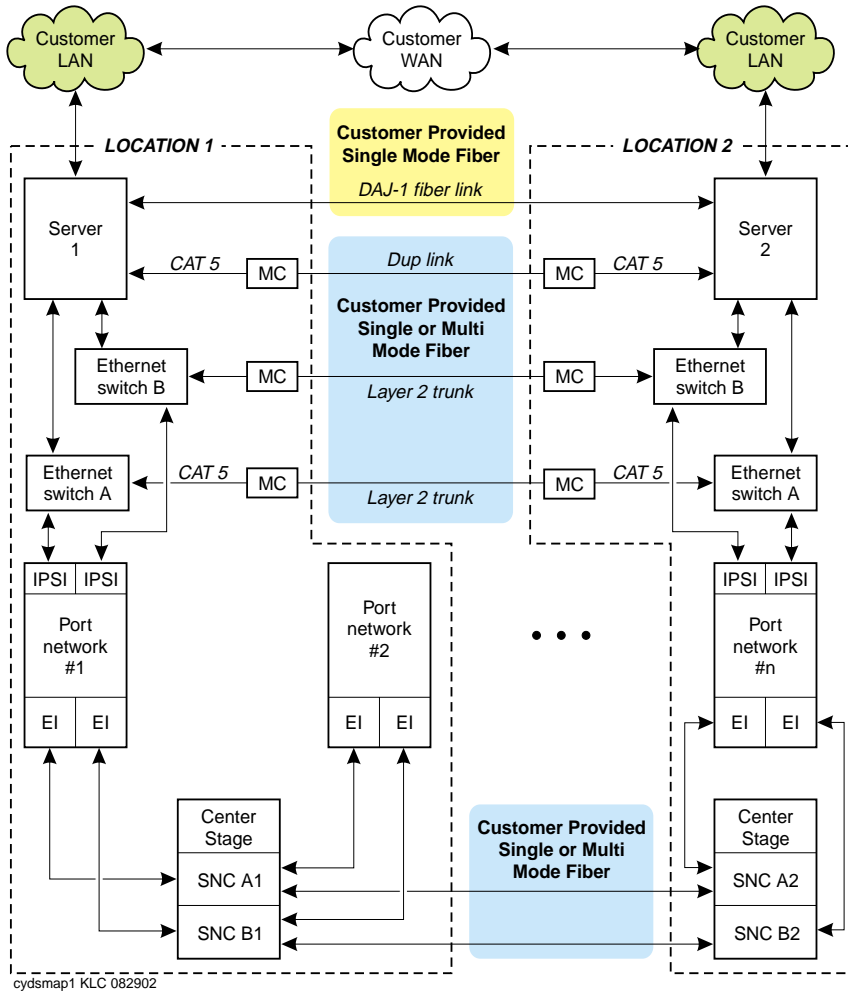


Server and CSS separation—Multi-Connect--critical reliability configuration

Figure 3 represents media servers that are geographically separated and port networks located with each media server. Media converters and customer-provided, single-mode fiber are used to extend the Ethernet duplication link between the servers. Customer-provided, single-mode fiber is used to extend the fiber duplication link between media servers. Control network data switches are provided at each media server location with 100 BaseT Layer 2 trunks between them. Transport for the Ethernet Layer 2 trunks is provided by media converters and customer-provided, single-mode fiber. Each center stage switch (CSS) consists of two switch node carriers (SNC). The SNCs are split between geographical locations with customer-provided, single-mode fiber supplying connectivity between the SNCs.

NOTE:
Note: Except for the duplex CSS, this figure applies to high reliability configurations.

Figure 3. Server and CSS separation—Multi-Connect--critical reliability configuration



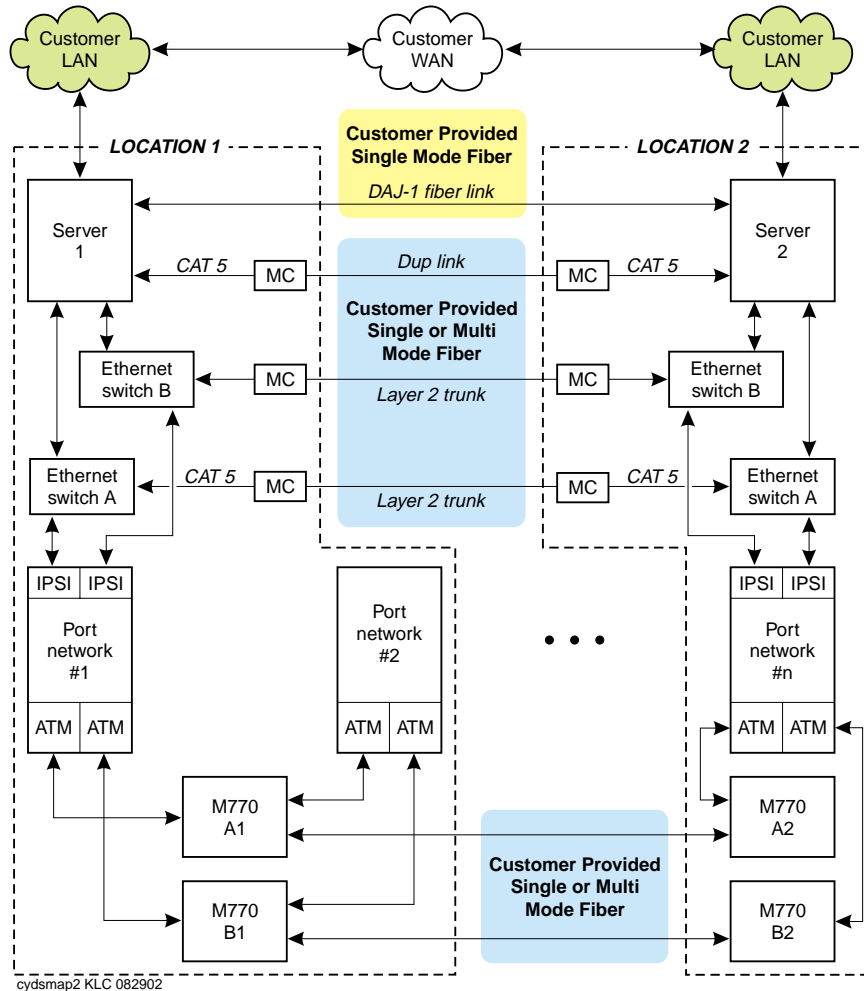
Server and ATM PNC separation--Multi-Connect--critical reliability configuration

Figure 4 represents media servers that are geographically separated and port networks located with each media server. Media converters and customer-provided, single-mode fiber are used to extend the Ethernet duplication link between the servers. Customer-provided, single-mode fiber is used to extend the fiber duplication link between media servers. Control network data switches are provided at each media server location with 100 BaseT Layer 2 trunks between them. Transport for the Ethernet Layer 2 trunks is provided by media converters and customer-provided, single-mode fiber. M770 ATM switches are provided at each location for port network connectivity (PNC). Customer provided single or multi-mode fiber is used for minimum OC3C connectivity between M770 switches in each PNC (M770A1 to M770A2 and M770B1 to M770B2).

NOTE:

Except for the duplex ATM switches, this figure applies to high reliability configurations.

Figure 4. Server and ATM switch separation--Multi-Connect--critical reliability configuration

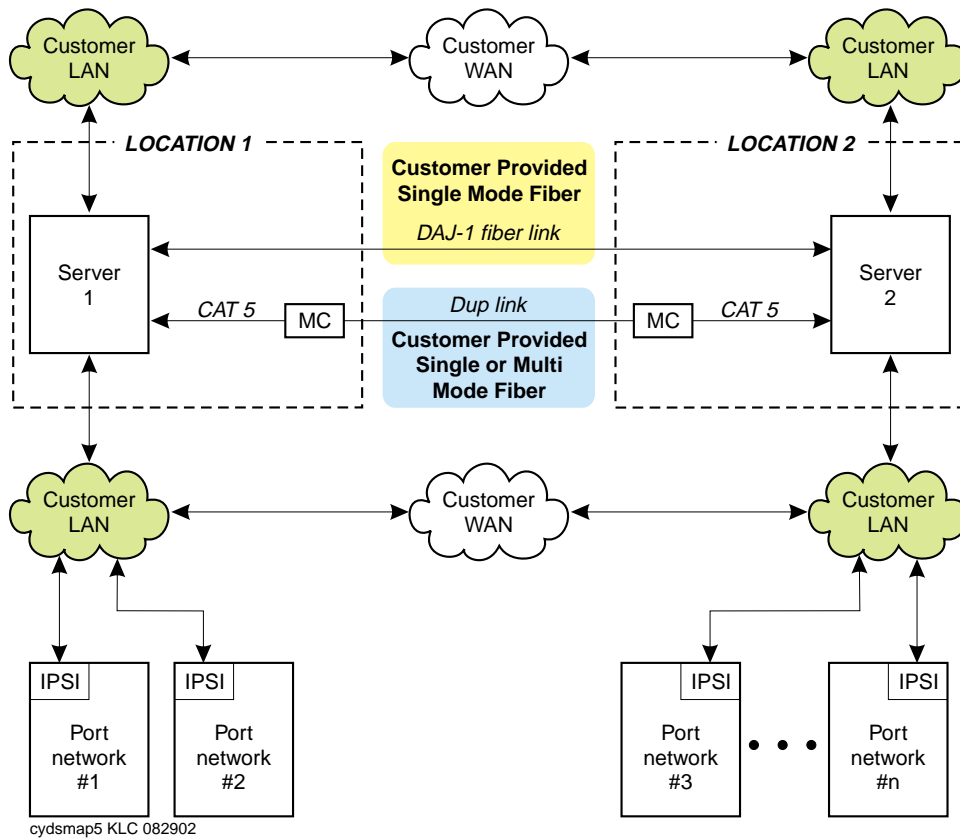


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Basic separation—duplex reliability, IP Connect configuration

Figure 5 represents an S8700 IP Connect configuration with the media servers geographically separated. Media converters and customer-provided, single-mode fiber are used to extend the Ethernet duplication link between the servers. Customer-provided, single-mode fiber is used to extend the fiber duplication link between media servers. G600 Media Gateways are connected to the servers via the customer's data network.

Figure 5. Basic separation—IP Connect



Power Specifications, Budgets, and Calculation Factors

Table 2. Specifications

Specification	Allied Telesyn AT-MC103XL (Single Mode)	Allied Telesyn AT-MC102XL (Multi-Mode)	DAJ1 (Single Mode)
Maximum Distance	15 Km	2 Km	10 Km
Transmitter Wavelength	1310 nm	1310 nm	1310 nm
Mode Field Diameter	9 μm	62.5 μm	9 μm
Cladding Diameter	125 μm	125 μm	Not Applicable
Transmitter Output Power (Minimum)	-15 dB	-19 dB	-9.5 dB
Transmitter Output Power (Typical)	-11.5 dB	-16.8 dB	Not Available
Transmitter Output Power (Maximum)	-8.0 dB	-14.0 dB	-3 dB
Receiver Wavelength	1310 nm	1310 nm	1310 nm
Receiver Sensitivity (Minimum)	-31 dB	-31.8 dB	-20 dB
Receiver Sensitivity (Typical)	-31 dB	-34.5 dB	Not Available
Receiver Sensitivity (Saturation)	-8 dB	-14.0 dB	-3 dB

⇒ NOTE:

10 kilometers = approximately 6 miles

The maximum distance specified in Table 2 is theoretical. The actual maximum distance obtained will depend on the quality of the fiber used and in all cases will be dependent on the shortest maximum distance obtainable on any given connection. When single mode fiber is used for all connections the limiting factor will be the DAJ1 board with a maximum distance of 10 kilometers. When multi-mode fiber is used for any of the connections, other than the fiber duplication link (which must always be single mode), the maximum distance will be 2 kilometers.

Job Aid

Optical Power budgets

The optical power budget calculation is required to ensure the fiber optic receivers can accurately interpret the light pulses. If the calculated loss exceeds the budget then it is likely there will be data errors. Every component between the transmitter and receiver contributes to optical fiber loss, including any media converters, connectors, splices, and propagation loss through the fiber itself.

The optical power budget is the amount of light available to make a fiber optic connection. Power budget is calculated using the formula:

Power Budget = Minimum Transmit Power - Minimum Receive Sensitivity

Power budgets for two media converters and the DAJ1 board are given below.

Allied Telesyn media converters

For the single mode media converter (AT-MC103XL) this would be:

Power Budget = -15 dB - (-31 dB) = 16 dB

For the multi-mode media converter (AT-MC102XL) this would be:

Power Budget = -19 dB - (-31.8 dB) = 12.8 dB

DAJ1

For the DAJ1 this would be:

Power Budget = -9.5 dB - (-20 dB) = 10.5 dB

Calculation factors

Various calculation factors must be considered when determining the loss over end-to-end fiber optic facilities. These include

- Fiber attenuation per kilometer. Typically measures 0.22 to 0.5 decibel per kilometer for single-mode fiber. Use 0.5 decibel per kilometer for power budget estimates.
- Connector loss. The Telecommunications Industry Association (TIA) standard for connector loss is 0.75 decibel. Use this for power budget estimates.
- Splice attenuation. The TIA standard for splices is 0.1 decibel. Use this value for power budget estimates.
- Safety margin. A safety margin value considers unforeseen future changes such as, temperature extremes, additional connectors, and splices. A minimum of 2.0 decibels of power budget must be set aside for a safety margin.

Calculations can be made using typical values for these factors. However, actual measurements of the proposed fiber using a Optical Time Domain Reflectometer (OTDR) yields the most accurate results.

Media Converter Option Switch settings

Allied Telesyn AT-MC102XL/AT-MC103XL

- Link Test/Missing Link button. Allows a link test to be performed on the media converter.
 - The Link Test function is invoked when the button is in the "out" position.
The link test function determines whether each port on the media converter is successfully receiving a signal from the device connected to it. Note: Performing a link test does not interfere with a media converter's ability to pass network traffic.
 - The Missing Link function is enabled when the button is in the "in" (default) position.
The missing link function enables the ports on the media converter to pass the link status of their connections to each other. For example, if the network twisted pair cable to the 100Base-TX port on the media converter were to fail, the media converter would respond by dropping the link on the 100 Base-FX fiber optic port.
- Auto-negotiation button.
 - The auto-negotiation feature is on when the button is in the "in" position.
For the duplication link between S8700 servers, this features setting should mirror the administration setting for the duplication link on the server. If the duplication link Ethernet port on the S8700 Media Server is set to *auto-sense* the button on the media converter should be in.
 - The auto-negotiation feature is off when the button is in the "out" position.
If the duplication link Ethernet port on the S8700 Media Server is explicitly set to half/full duplex, the button on the media converter should be out.

 **CAUTION:**

Setting the media converter to *auto-negotiate* and setting the media server to *100 Mps/Full* results in a duplex mismatch, causes error conditions on the link, and degrades performance. Verify that the duplication Ethernet port on the S8700 Media Server is set to *auto-sense*. Verify that the auto-negotiate button on the media converter is pushed in.

- MDI/MDI-X button. This button provides a crossover function on the RJ45 100BaseT port.
 - The Ethernet connection is straight through when the button is in the "in" position.
 - A crossover function is invoked when the button is in the "out" position.

The Ethernet duplication link requires a crossover between the duplication ports on the S8700 media servers. Care should be taken to only invoke the crossover function on one of the media converters in the connection. Also, be careful that straight through CAT5 cables are used on both ends of the connection between the media servers and the media converters.

