



Understanding Multigeneration Configurations on the Cisco MDS 9000 Family of Switches and Directors

To mix first- and second-generation modules in the Cisco MDS 9000 Family of Switches and Directors, you must first understand how the Cisco MDS Port indexing mechanism works.

SUMMARY

The Cisco® MDS 9000 Family of switches and directors offers true investment protection by enabling second-generation modules to intermix with first-generation line-card modules in the same chassis. This unique capability gives storage area network (SAN) architects additional performance and features without the need for a complete upgrade or a redesign of the entire SAN.

To successfully plan for an intermixed environment, it is important to understand a basic component of the Cisco MDS 9000 Family architecture: the port index. This document describes what a port index is and how it affects the intermixing of first- and second-generation Cisco MDS 9000 Family hardware within a single chassis.

PORT INDEXES DEFINED

In the context of the Cisco MDS 9000 Family, a *port index* is a unique ID assigned to each logical port within the switch. The port index ID should not be confused with the Fibre Channel or Ethernet addressing mechanism. These IDs are not exposed to the end user; instead, the internal switching hardware uses them to identify internal destinations at the lowest level of frame-forwarding within the switch.

Each logical port within a Cisco MDS 9000 module receives a port index ID. There are three types of logical ports within the Cisco MDS platform that are assigned a port index*: Fibre Channel, Small Computer Systems Interface over IP (iSCSI), and Fibre Channel over IP (FCIP). Table 1 shows how many port indexes are used by various Cisco MDS 9000 Series line-card modules.

Table 1. The Number of Port Indexes Used by Various Cisco MDS 9000 Modules

Module	Port Indexes Consumed
DS-X9016	16
DS-X9032	32
DS-X9032-SSM	32
DS-X9304-SMIP	16**
DS-X9308-SMIP	32**
DS-X9302-14K9	22**
DS-X9112	12
DS-X9124	24
DS-X9148	48
DS-X9704	4

* A Port Channel can be considered a logical port but it does not consume a port index rather the interfaces that comprise the Port Channel consume them.

** Each port IP services physical interface supports up to three FCIP tunnels. Therefore every IP services physical interface is assigned four index IDs, three for FCIP and one for iSCSI.

CISCO MDS 9000 FAMILY ARCHITECTURE

The first-generation Cisco MDS 9000 hardware allowed for an architectural limit of 256 port indexes. In other words, for first-generation modules, the internal forwarding hardware has the ability to send a frame to one of 256 destinations within the switch. Each supervisor module within the chassis uses 2-port indexes for various Cisco MDS features, allowing for a practical limitation of 252 IDs available to line-card modules. Furthermore, with the initially available chassis and line-card modules, it was not possible to reach this practical limitation. At most, 224 of the available 252 indexes were used in any given switch configuration.

With the introduction of the second-generation line-card modules and the Cisco MDS 9513 Multilayer Director chassis, Cisco Systems® provides a new level of scalability and density within a Fibre Channel director switch. A single Cisco MDS 9513 can scale to 528 Fibre Channel ports. To accommodate this level of scalability, second-generation Cisco MDS 9000 products were designed with an internal port index limitation of 1024 IDs. Taking into account the ports used by the supervisor modules, the theoretical limit of addressable logical ports in second-generation Cisco MDS hardware is 1020.

MIXING HARDWARE GENERATIONS WITHIN A CHASSIS

When first- and second-generation hardware is mixed in a chassis, the logical port-count limitation is that of the first-generation modules. This limitation ensures that each logical port on the first-generation module is able to address the logical ports on the second-generation module. Yet, by allowing mixed configurations of first- and second-generation hardware in the same chassis, first-generation Cisco MDS 9000 switches and directors actually achieve a higher port count than was previously achievable in a first-generation only chassis. Table 2 shows the Fibre Channel port counts for first-generation, second-generation, and mixed-generation Cisco MDS 9000 switches.

Table 2. Port Counts in First-Generation, Second-Generation, and Mixed-Configuration Switches

	Cisco MDS 9216/9216i	Cisco MDS 9506	Cisco MDS 9509	Cisco MDS 9513
First-Generation Only Port Count Limits	48	128	224	252
Second-Generation Only Port Count Limits	-.***	192	336	528
Mixed-Configuration Port Count Limits	64	192	252	252

*** The Cisco MDS 9216A and the Cisco MDS 9216i have a fixed first generation module and an open slot for an additional module. While the second slot can accommodate a second generation module a fully second generation configuration is not possible.

The logical port limitation of 252 in a mixed configuration has no impact on the Cisco MDS 9200 Series or the Cisco MDS 9506 because there is no configuration of modules that can exceed this limit. There are, however, configurations in the Cisco MDS 9509 and the Cisco MDS 9513 where mixing modules in a chassis may limit the number of ports.

CONCLUSION

The architectural design of the Cisco MDS 9000 Family of switches and directors provides one of the industry's most flexible platforms. This flexibility allows unprecedented investment protection at a time when IT budgets can't support forklift upgrade strategies. By allowing the intermixing of first- and second-generation hardware in Cisco MDS 9000 Family platforms, Cisco uniquely positions data centers for easy upgrades to future technologies, such as the addition of 4-Gbps and 10-Gbps Fibre Channels within an existing platform. Although there certainly are guidelines to intermixing generations of Cisco MDS 9000 modules, with proper planning and a basic understanding of port indexes, SAN architects can design around them and ensure the SAN is ready for future storage network requirements.

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