

**IBM Poughkeepsie**  
**IBM @server zSeries 900**

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**zSeries Channel Communication  
Supported FICON Topologies,  
Link Addressing, and Operation**

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## **zSeries FICON - Cascade Switching**

- zSeries FICON Cascade switching provides a channel connectivity solution for connection of zSeries Processors and/or Control Units that are installed in extended distance locations
  - ▶ This presentation is one of a series that cover FICON cascade switching
  
- zSeries I/O configuration infrastructure savings to a customer are:
  - ▶ Large reduction of expensive inter-site fibre links
  - ▶ Reduction in the number of zSeries FICON channels
  - ▶ Reduction in the number of Fibre Channel switch ports
  
- This allows the zSeries Processors to further participate in the Fibre Channel Fabric infrastructure

## zSeries FICON Topology

### ● FICON native (FC mode - Fibre Channel) Topologies

#### ▶ Point-to-Point

- No Fibre Channel switch in the channel to control unit path
- FICON channel and CU - Link recovery

#### ▶ Switched Point-to-Point

- One Fibre Channel switch in the channel to control unit path
- FICON channel and CU - Link and F\_Port recovery

#### ▶ 2-switch Cascade Switching

- There can be up to two Fibre Channel switches in the channel to control unit path
- There maybe more than two switches in the *fibre channel fabric*, but there must only be one possible switching hop between the channel and the target control unit port
- High integrity fabric and persistent F\_Port port addresses
- FICON channel and CU - Link, F\_port and Fabric recovery

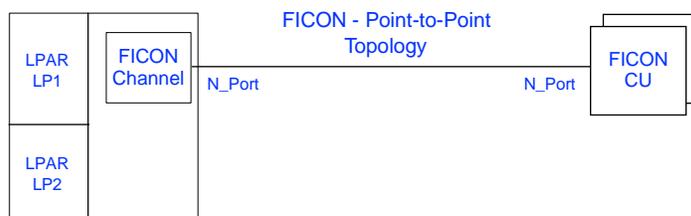
#### ▶ Multi-switch Cascade Switching

- There can be up multiple Fibre Channel switches in the channel to control unit path
- There maybe more than two switches in the *fibre channel fabric*, and there can be more than one switching hop between the channel and the target control unit port
- High integrity fabric and persistent F\_Port port addresses
- FICON channel and CU - Link, F\_port and Fabric recovery

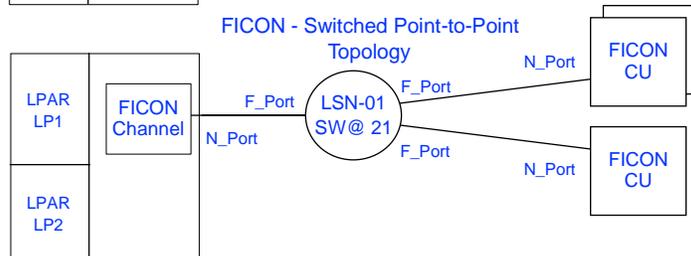
#### ▶ Full cascade switching

- More than two fibre channel switches in the channel to control unit path, total SAN manager, and N\_Port port address discovery
- One or more possible switching routes between the channel and the target control unit

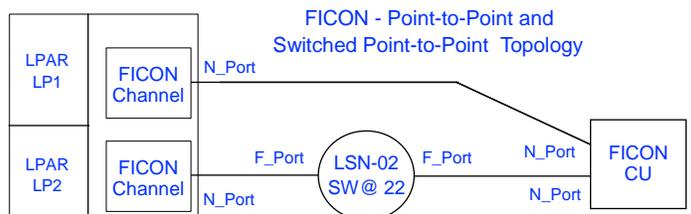
## FICON - Point-to-Point and Switched Point-to-Point



No FC switch in the channel to CU path. But there can be multiple channel images (LPAR) and multiple CU images sharing the one communication link. .



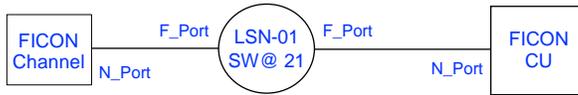
One FC switch in the channel to CU path. The channel can address multiple CUs on different FC links (F\_Port to N\_Port links). The LSN (logical Switch Number) is a z/OS term, and is used by HCD, IOCP and IO-OPs. Switch @ is the same as bit 1 -8 of the 24 bit FC port address.



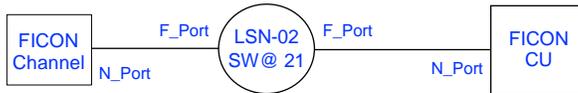
The zSeries and S/390 processors will support both FICON Point-to-Point and Switched Point-to-Point connectivity from the same processor image to the same CU image.

## FICON - Single Switch - Switched P-to-P

FICON - Switched Point-to-Point Topology



The LSN (logical Switch Number) is a z/OS term, and is used by HCD, IOCP and IO-OPs. The LSN has to be unique in the scope of the z900 I/O configuration definition process (HCD or IOCP).



The SW @ (switch address) is the same as the Domain Address and is the first 8 bits of the 24 bit FC port address (ddaapp). The SW @ (Domain Address) must be unique within a fabric

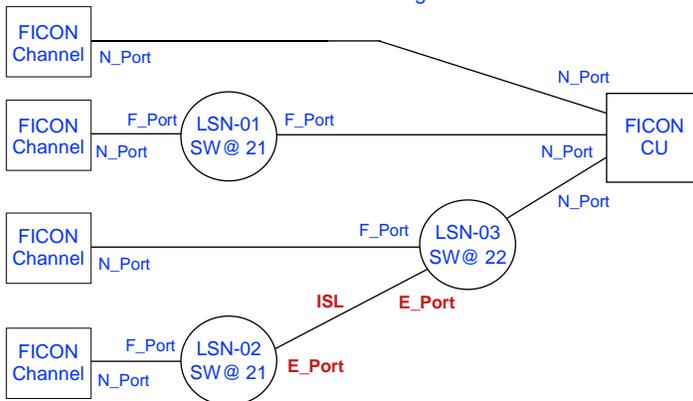
## Cascade Switching - E\_Ports and ISLs

FICON - 2-switch Cascade Switching - Topology



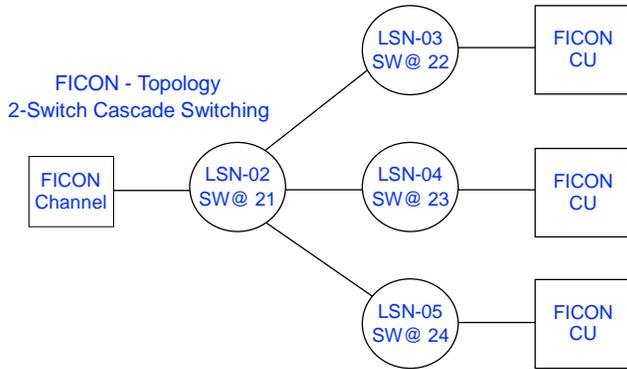
For those processors that support FICON cascade switching, there can be up to 2 Fibre Channel switches in a channel to control unit path when 2 switch cascade switching is supported path. The fibre link between the two switches is referred to as a Inter-switch Link (ISL and the inter-switch link ports are referred to as E\_Ports

FICON - Topology Point-to-Point, Switched Point-to-Point 2-Switch Cascade Switching

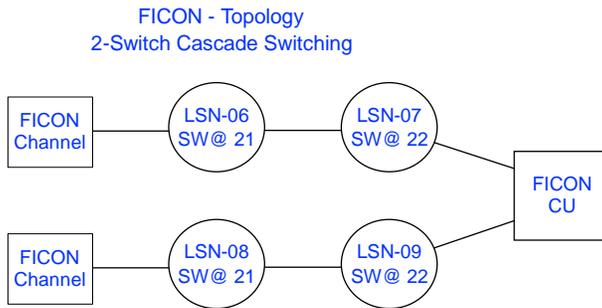


Up 8 paths are supported from a system (processor or processor image) to a CU (CU image or physical CU). The channel to CU paths can be a mix of FICON, Point-to-Point, Switched Point-to-Point and 2-switch cascade switching, paths.

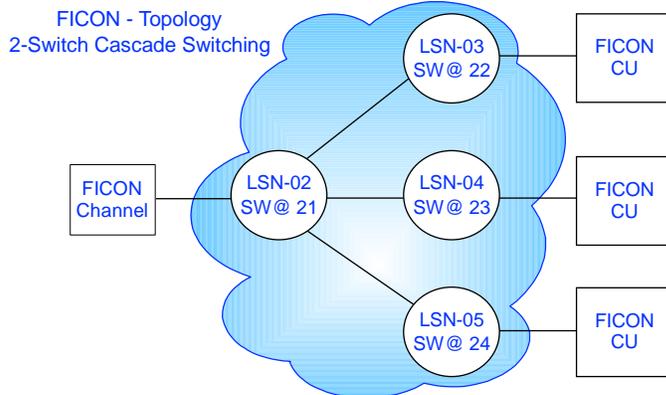
## FICON - 2-switch Cascade Switching



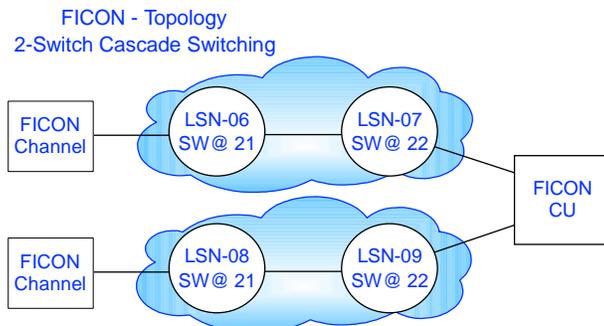
FICON channel 2-switch cascade switching will support up to two Fibre Channel switches in a channel to control unit path. There may be more than two switches in the fibre channel fabric, but there should only be one possible 'switch' switching route between the channel and the target control unit (destination port)



## Fibre Channel - Switch Fabrics



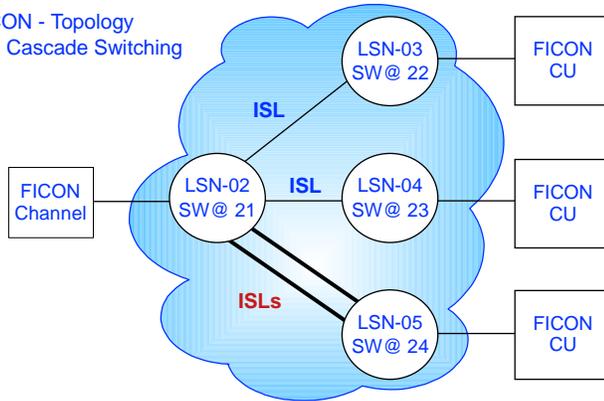
The Fibre Channel standard refers to a Fibre Channel fabric. It is a term used to describe a common connection of switches. All switches that are connected together via inter-switch links are considered to be in the same fabric



For S/390 and z900 processors, a FICON Fibre Channel Fabric is not a configuration definition item.

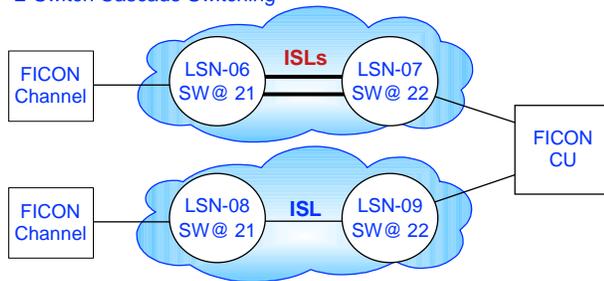
## Fibre Channel Fabric - Multiple ISLs

FICON - Topology  
2-Switch Cascade Switching



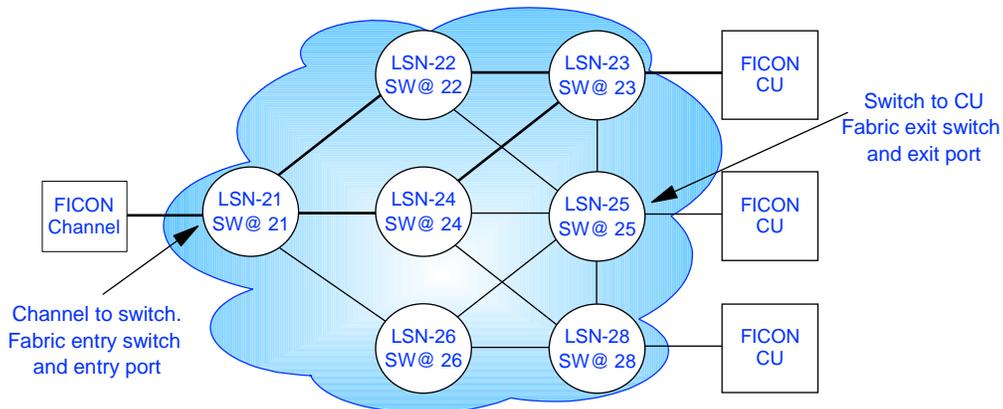
There can be more than one inter-switch link (ISL) connection between a pair of switches. ISLs are not defined in the zSeries processor I/O definition nor are they seen as unique paths by z/OS. When defining access from a processor FICON channel to a FICON control unit interface, only the FICON channel path (CHPID) and destination link address are defined

FICON - Topology  
2-Switch Cascade Switching



## Multi-switch Cascade Switching

FICON - Topology  
Multi-Switch Cascade Switching



With FICON Multi-switch cascade switching there may be more than two switches in the FICON Channel to CU path and there may be more than one switching path route within the fabric between the FICON channel switch entry port and the Switch to FICON CU exit port (example, switch routing from the FICON channel entry port to the CU exit port - 21- 22 - 23, or 21 - 24 - 23)

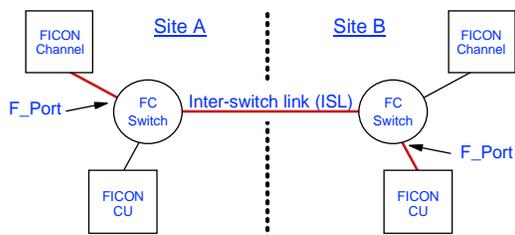
It is strongly recommended that the LSN and the Switch Address (SW @ - Switch Domain address) be the same hexadecimal value.

The switching routing within the fabric between two F\_Ports is determined by the fabric (implementation by the switch vendor)

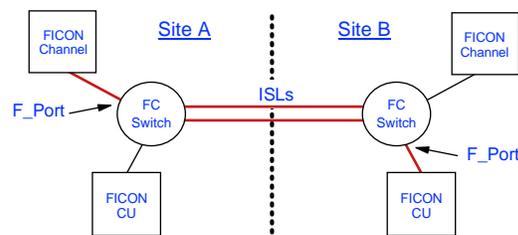
## Cascade Switching - Switching Routes

- The following foils show fibre channel fabrics that have the following conditions
  - ▶ Single or Multiple - Channel to CU paths
    - For the multiple paths case, the additional paths are either through the same fabric or through another fabric
    - For FICON, if there are multiple channel to CU paths, it is preferred that they be spread across the FC fabrics
  - ▶ Single or multiple - E\_Port to E\_port ISLs (Inter-switch links)
    - Which ISL is used is determined by the fabric, not just by the FC D\_ID
  - ▶ Single or multiple - F\_Port to F\_Port switch route
    - They may be more than one switch switching-route between two F\_Ports in the same fabric
    - Which switch route is used is determined by the fabric, not just by the FC D\_ID
  - ▶ Single or multiple - FC Fabrics
    - For FICON when there are multiple ISL between sites it is recommended that that they be spread across switches that are in different fabrics

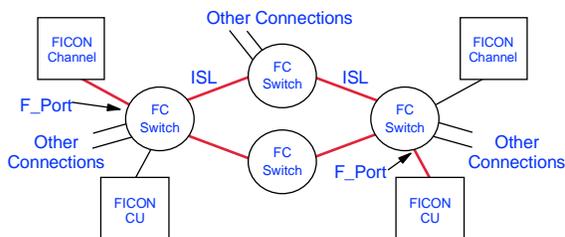
## FICON Cascade Switching Topology



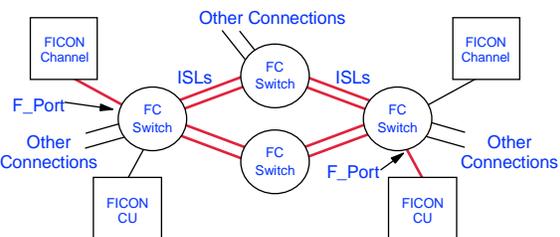
Single Channel to CU path  
 Single ISL  
 Single F\_Port to F\_Port switch route  
 Single FC Fabric



Single Channel to CU path  
 Multiple ISLs (multiple ISL routes)  
 Single F\_Port to F\_Port switch route  
 Single FC Fabric

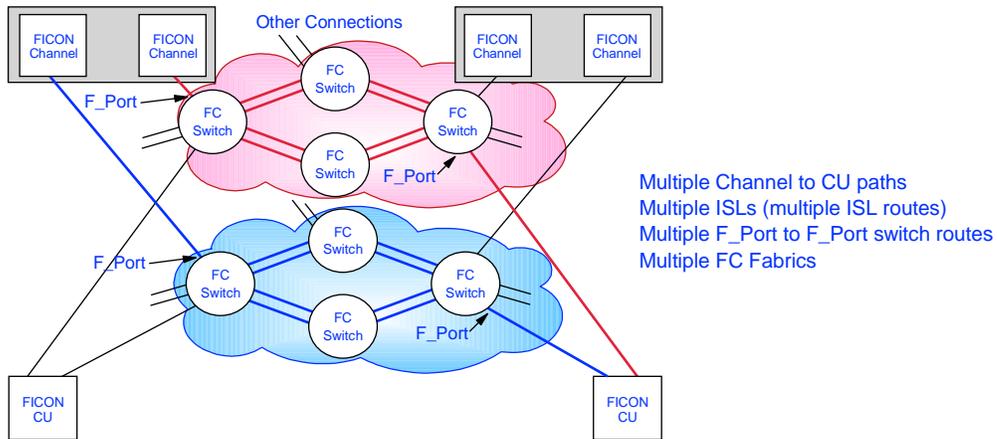
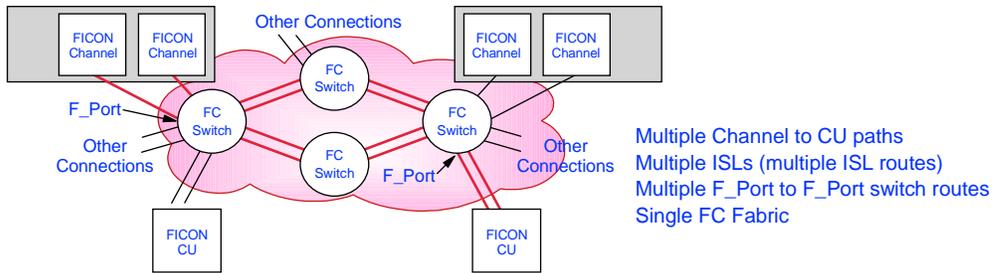


Single Channel to CU path  
 Single ISLs  
 Multiple F\_Port to F\_Port switch routes  
 Single FC Fabric

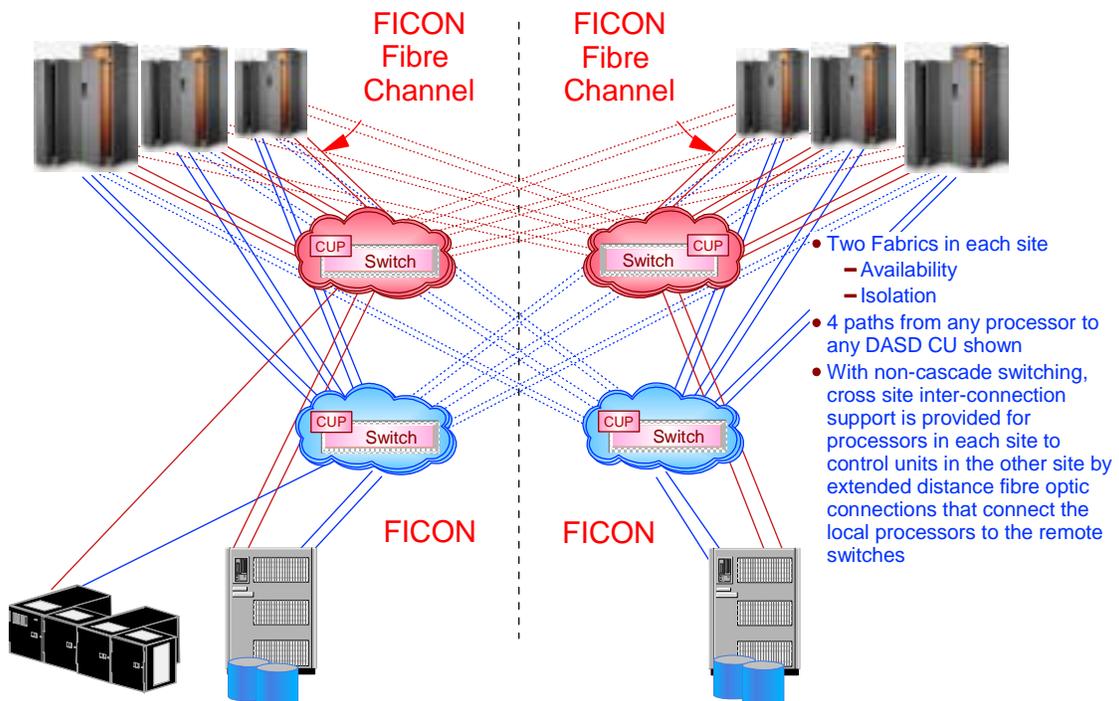


Single Channel to CU path  
 Multiple ISLs (multiple ISL routes)  
 Multiple F\_Port to F\_Port switch routes  
 Single FC Fabric

## FICON Cascade Switching Topology



## Multiple Sites - Non-Cascade Switching



## Multiple Sites - 2-Switch Cascade Switching

