



# Intra-Switch Management Interface Use Cases for Single Pair Ethernet

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# Current Intra-Switch Management Plane Architecture

- Intra-switch control plane is used to perform configuration/monitoring of components in the switch
- Many different components with various control plane interfaces

## ➤ I2C/SMB Bus

- Optical Module, AC/DC Power Supplies, FAN Control, DC-DC Converters, Temp monitors, EPROM etc....
- 2 wire – Clock + Shared Data (Tx/Rx)
- Clock speed 100KHz, data BW (25 to 30Kb/s) limited due half-duplex and protocol overhead

## ➤ UART: Universal Asynchronous Rx/Tx

- Micro-controllers/CPU
- 2 wire – Rx/Tx
- 9.6Kb/s

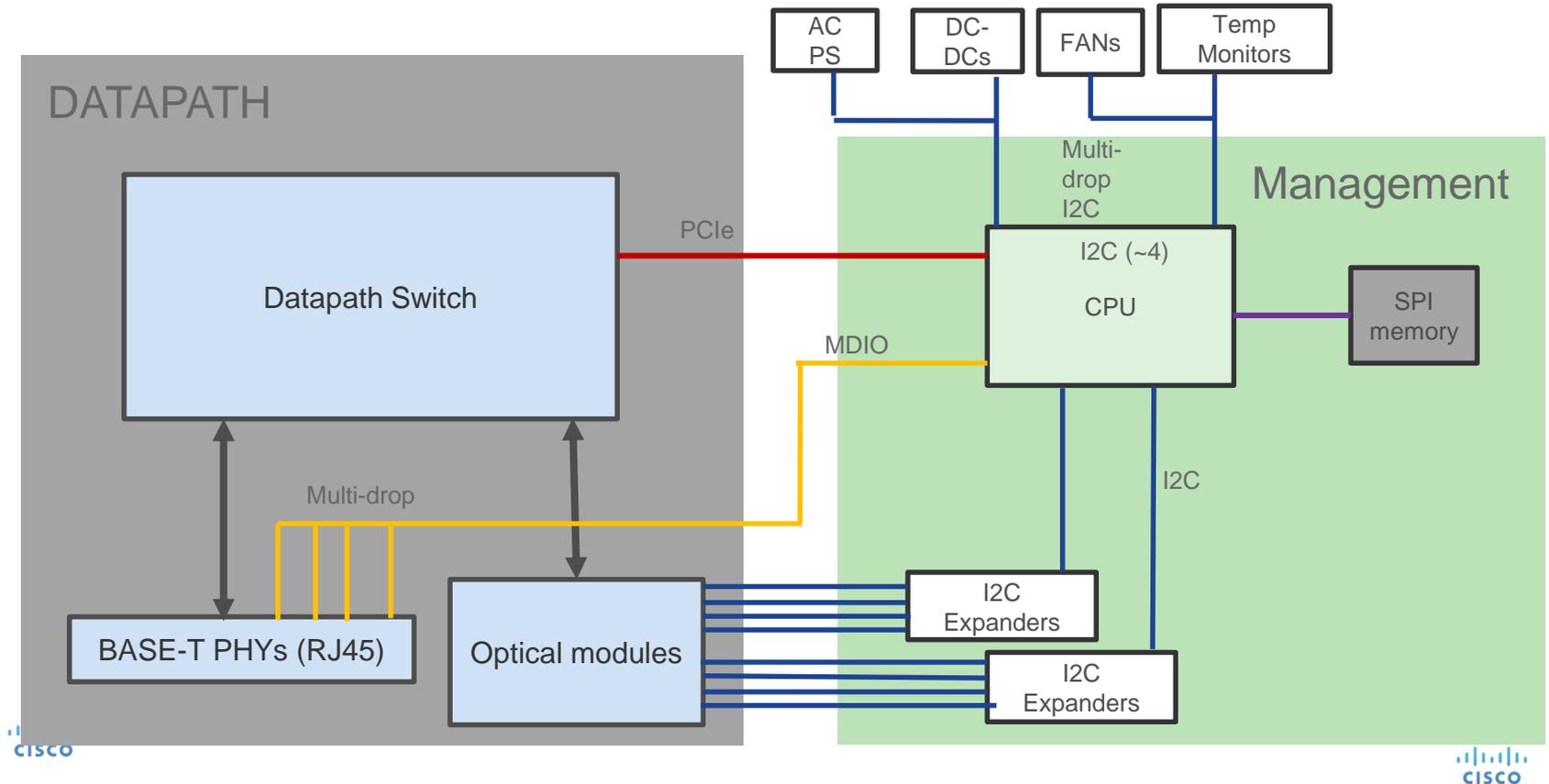
## ➤ MDIO (IEEE 802.3 Clause 22/45): Copper PHYs and Fiber PHYs

- 2 wire
- Tx/Rx shared (half-duplex)
- Max specified MDC clock of 2.5MHz (avg. BW 1Mb/s)

## ➤ SPI :

- SD card, Sensors, eMMC
- Minimum of 4 wire – Clock, Rx, Tx and Save Select (incase of multiple devices connected to same data pins)
- Typically 12 to 25Mb/s
- Allows more data wires to used for higher bandwidth

# Typical Switch: Datapath/Management Plane

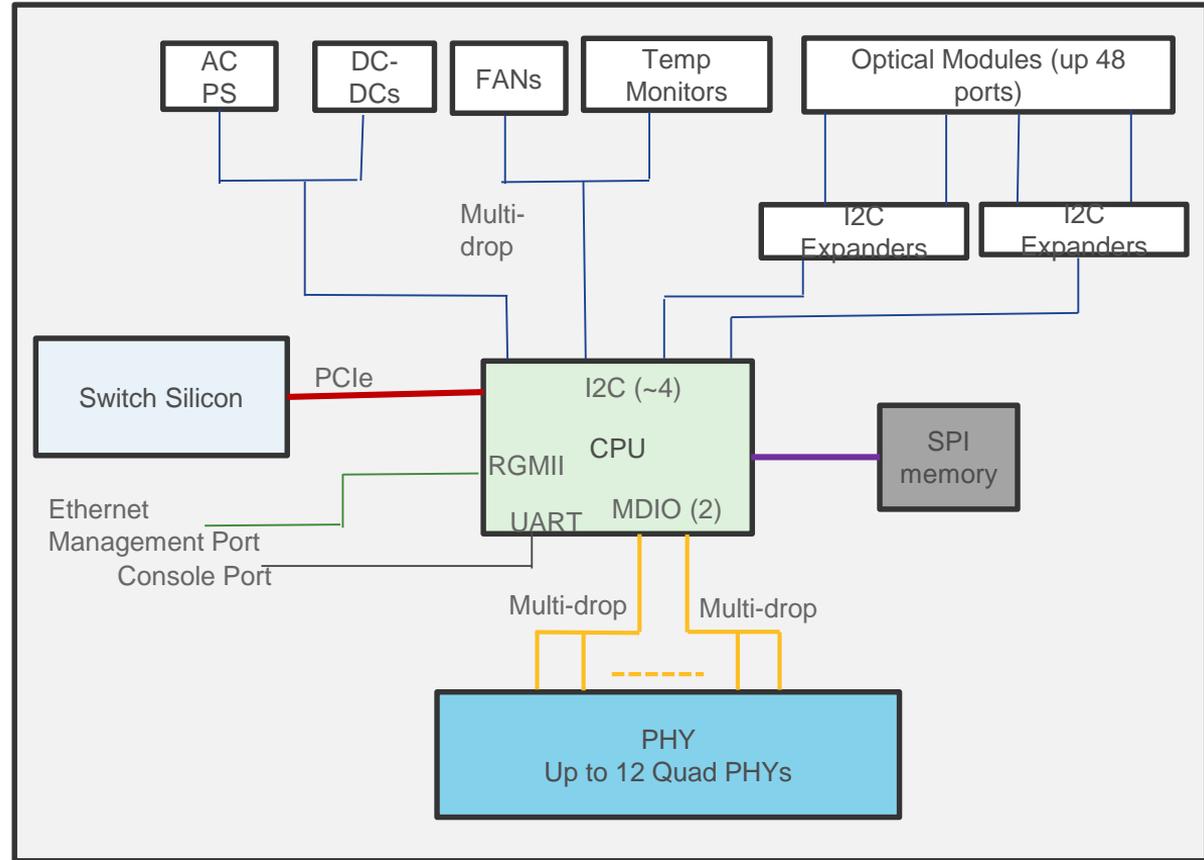


# Current Intra-Switch Management *Interfaces*

- Current management interfaces specified in isolation to solve a particular issue, not ideal for overall system management
- Management Interfaces have not kept up with BW requirements – Devices require more configuration and status monitoring, examples includes
  - AC Power Supplies: Temp, voltage, current, fan monitoring
  - DC-DC converters : Temp, voltage, current
  - Copper PHY and Copper PHY => Firmware image increases with complexity
  - FAN and temperature sensors
  - Pluggable Optical Modules
- As complexity increases, management interface needs to be provide reliable and faster access
  - For example, I2C/SMBUS very un-reliable when used as multi-drop bus
  - Each interface requires different “Software Drivers” : increase development and support costs
- Number of managed end devices per 1RU 48 port switch
  - Copper – 6 MDIO’s, 12 I2C using Multi-drop or 16 MDIO’s and 32 I2C Point-to-Point
  - Fiber Native Support (no PHY) – 24 I2C using Multi-drop or 56 I2C for Point-to-Point

# Current Typical Switch Management Arch

- Too many interface types
- I/O types limited on CPU – require external devices to expand I/O
- Multi-drop – subject multiple failure conditions
- Limited BW
- Multiple Software Driver requirements

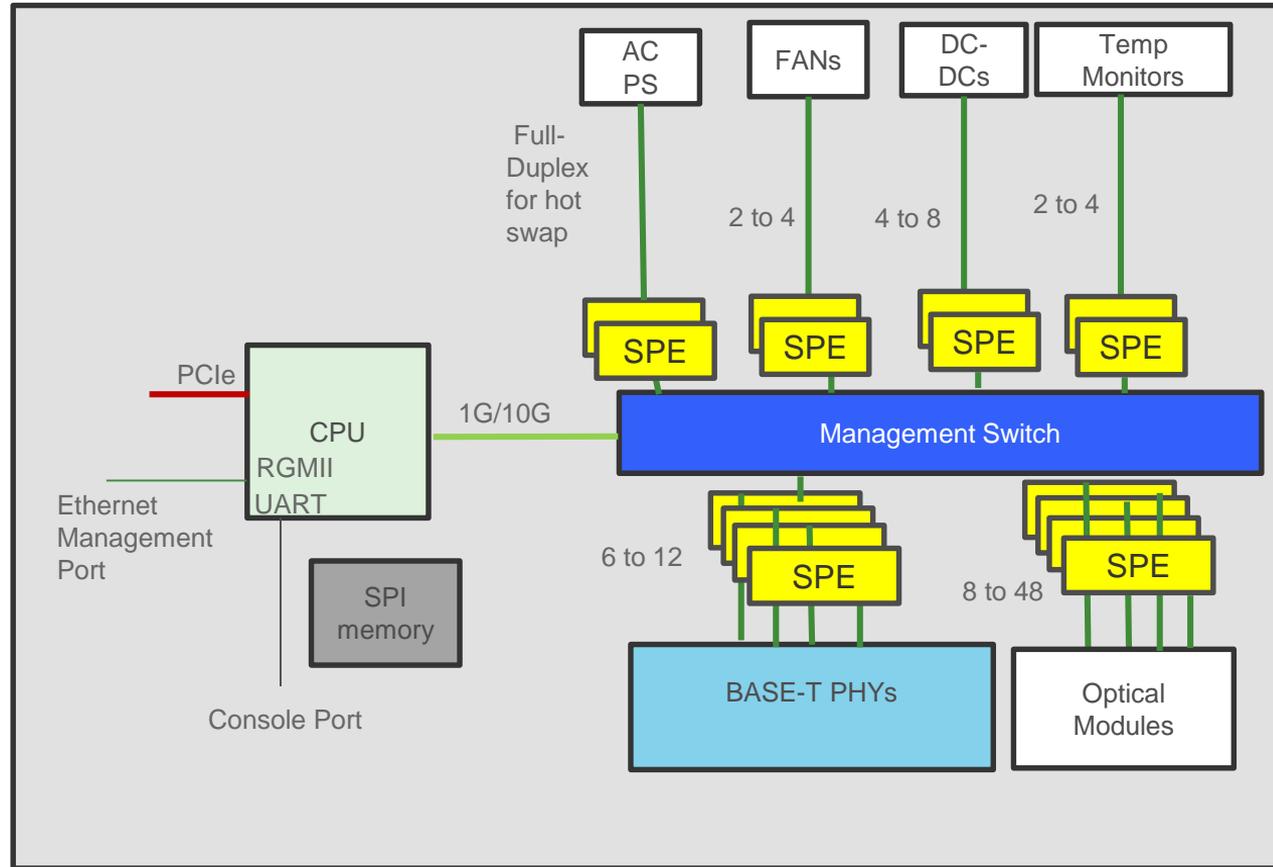


# Proposed Intra-Switch Management Interface

- 2-wire: Reduce inter-connect
- At least 10Mb/s (up to 100Mb/s should be considered for future)
- Ethernet based – one common driver
- Switched Point-to-Point full duplex – for BW or hot-swappable devices
- Interface can be on the same PHYSICAL board or across backplane with at least two connectors (4 connectors worst case)

# Proposed Switch Management Arch

- Number of different I/O types reduced by using
- CPU I/O limitation for I2C/MDO removed
- Point-Point Ethernet for BW and or Hot-swappable interfaces
- Single Ethernet Driver



# Topics for Discussion

- Backward/forward compatibility
  - Migration to Single Pair management interface will take time due to wide adaption of I2C/MDIO
    - Support legacy and SPE pluggable optics on a given system
- Issues to consider
  - Link Segment definition
  - Support same connectors and PCB trace for legacy and SPE
  - Discovery/Configuration of legacy vs. Single Pair Ethernet . System issue but how can we help
  - Clocking – loop timing, no requirement for reference clock on end-point
  - Support Auto-negotiation