

PTP - An update on best practice

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Lessons Have Been Learned...



- PTP, SMPTE 2059 continues to be the most crucial aspect of any ST2110 installation
- Many questions are asked regarding the best practices of designing a scalable and robust PTP distribution network
- Best practices are available to aid in these design considerations

QUESTION 1:
Are all switches
created equal?

- No. And true PTP support is very crucial!

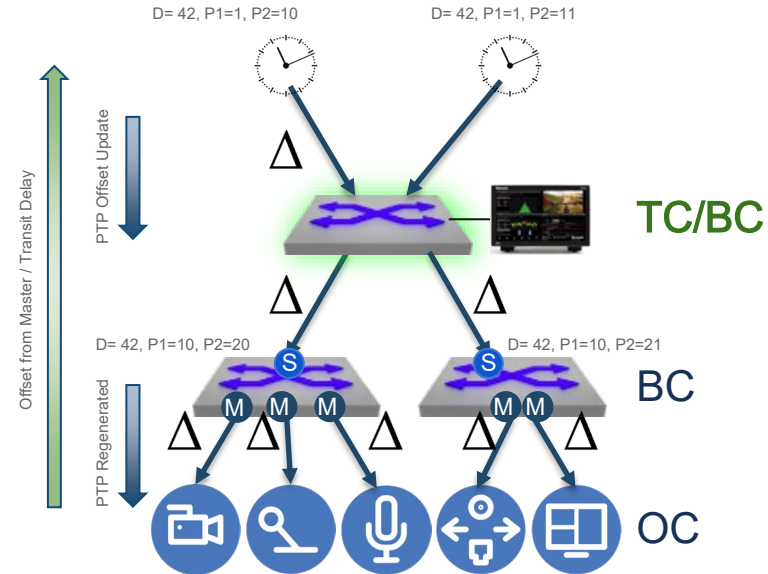
Understanding the differences between Boundary Clock and Transparent Clock - crucial

Ask about scale!

PTP FAQ and Best Practices



- **Transparent Clock**
 - Eliminates switch delay (== jitter)
 - Faster BMCA
 - Messages forwarded through switch and **Timestamp updated**
 - Slaves use correction field to improve accuracy
 - Multicast routing is required
 - **Scale of GM is not offloaded**
- **Boundary Clock**
 - Eliminates switch delay (== jitter)
 - Switch acts as both Slave and Master, offloading GM
 - Interfaces can be configured with different PTP profiles
 - Switch will free-run based on previous GM lock in the absence of a real GM or during BMCA
 - Simpler configuration because BC messages don't require PIM for multicast routing
 - SOME security with PTP Role Master
 - Reduces multicast messages to all other Slaves

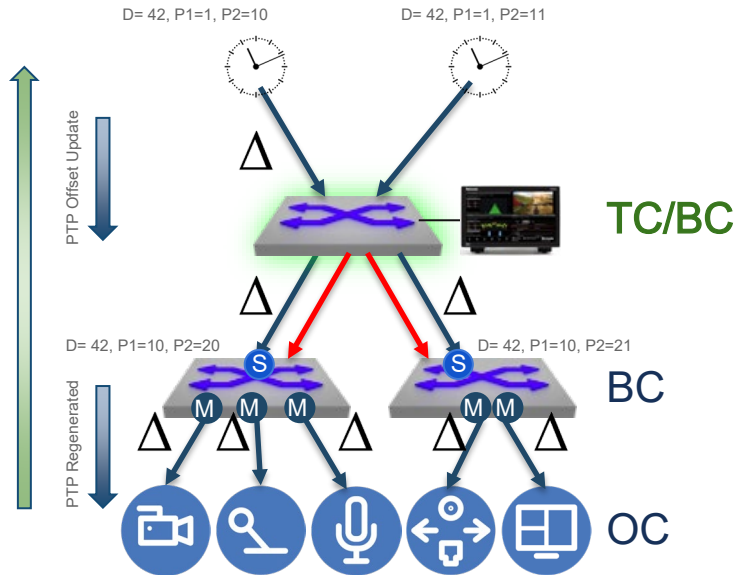


QUESTION 2:
What version(s) of
PTP are required?

- PTP V2
- PTP V1?

This impacts the design of your network. Why? PTP Messaging is multicast, but may not always be in data plane.

PTP FAQ and Best Practices



- Check hardware and software versions
- Sometimes, dedicated PTP-V1 links are needed in a network primarily designed for PTP V2

QUESTION 3:
What does a solid
configuration look
like?

- Consistency is vital
- A common and methodical configuration
- Take advantage of PTP Role Master

PTP FAQ and Best Practices



GM

Domain Consistent = 42

Primary GM: P1 = 1, P2 = 10, 2059-2 Profile

Secondary GM: P1 = 1, P2 = 11, 2059-2 Profile

TC/BC

Multicast & Unicast Routing

Domain Consistent = 42

Switch: PTP E2E Transparent / Boundary Mode

PTP Source IP Address

Host Interfaces: PTP Enable

BC

Multicast & Unicast Routing & Rendezvous Point

Domain Consistent = 42

Switch: PTP Boundary Mode

PTP Source IP Address

Left Switch: P1 = 10, P2 = 20, TTL = 3

BC

Interfaces

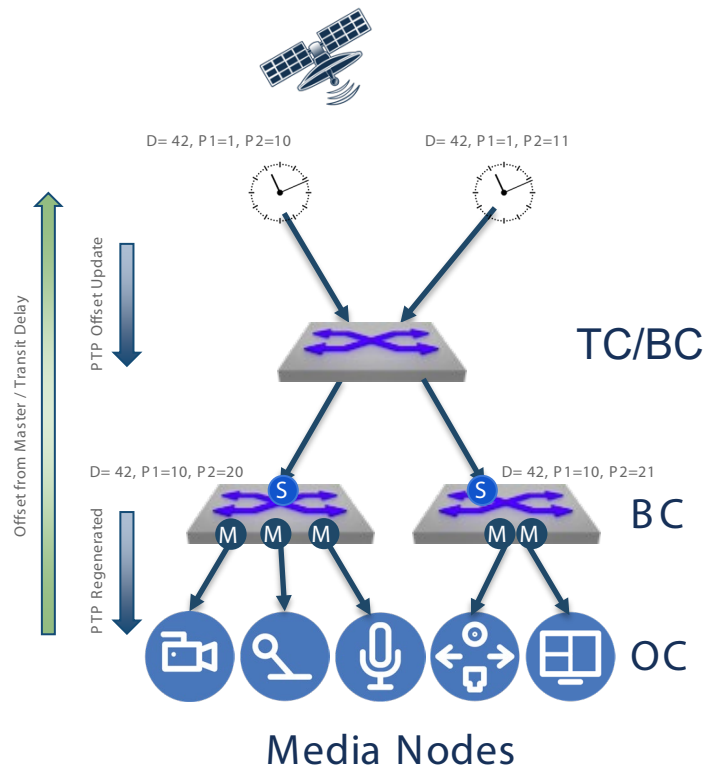
Host Interfaces:

PTP Enable

SMPTE 2059-2 Profile

QoS to Prioritize PTP

PTP Master Only



QUESTION 4:
What if I have a
Red and Blue
system? How do I
connect them
together? How
many GMs?

- Red and Blue networks should allow connectivity between them for PTP.
- Multiple GMs are recommended in the system for redundancy - ensure all devices lock to ONE GM.

PTP FAQ and Best Practices

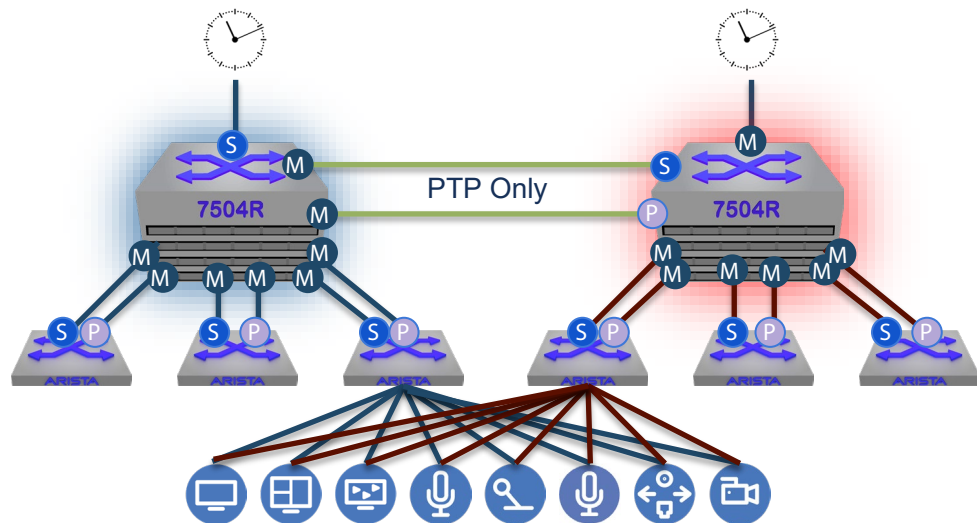


PTP Only Link Between Spine Switches

Option 1: Create an unused dedicated VLAN
(No routing enable for this VLAN)

Option 2: Configure an interface as “no switchport” / routed interface with no IP address.

Be very careful not to leak routes between the two Spine switches, unless this is intentional and there is proper bandwidth planning.



QUESTION 5:
What if I have
devices supporting
LACP? Can I still
use a Boundary
Clock?

- Comes back to choosing your platforms
- <https://www.arista.com/en/support/toi/eos-4-26-2f/14803-ptp-mlag>

QUESTION 6:
Do I really need
PTP monitoring
tools?

- Yes, most definitely!
Invest in tools that can
provide both real-time
and historical data

PTP FAQ and Best Practices



- There are on-switch CLI, built-in, and customized dashboards with added logic available!

PTP Health

Shows if all devices in the network are locked to expected GMID, Domain ID and PTP Mode

ERROR

PTP Config

key	domain number	gmid	ptpMode
campus-leaf-4	127	236-70-112-255-254-0-191	ptpBoundaryClock
media-leaf-1	127	236-70-112-255-254-0-191	ptpBoundaryClock
media-leaf-2	127	236-70-112-255-254-0-191	ptpBoundaryClock
media-leaf-3	127	236-70-112-255-254-0-191	ptpBoundaryClock
media-PTP-1	127	236-70-112-255-254-0-191	ptpBoundaryClock

```
[7050TX-1#show ptp monitor
PTP Mode: Boundary Clock
Ptp monitoring: enabled
Number of entries: 100
Offset from master threshold: not configured
Mean path delay threshold: not configured
Skew threshold: not configured
```

PTP Grandmaster Clock Identity

Device	GMID
7050TX-1-base	b8:27:eb:ff:fe:7b:61:fc
7050TX-2-base	00:80:ea:ff:fe:d0:25:a5
7150S-1-base	00:80:ea:ff:fe:d0:25:a5

PTP Parent Clock Identity

Device	GMID
7050TX-1-base	b8:27:eb:ff:fe:7b:61:fc
7050TX-2-base	00:00:00:00:00:00:01
7150S-1-base	00:80:ea:ff:fe:d0:25:a5

PTP Mean Path Delay

Device	Mean Path Delay (ns)
7050TX-1-base	79,034 ns
7150S-1-base	149 ns
7050TX-2-base	914 ns

1-Minute CPU Load Average

Device	1-Minute CPU Load Average
7050TX-1-base	0.482
7050TX-2-base	0.56
7150S-1-base	0.948

Interface	Time	Offset from Master (ns)	Mean Path Delay (ns)
Po102	11:19:10.912 UTC Mar 25 2019	498	379408
Po102	11:19:10.787 UTC Mar 25 2019	10	379408
Po102	11:19:10.662 UTC Mar 25 2019	-25	379408
Po102	11:19:10.537 UTC Mar 25 2019	-13	379408
Po102	11:19:10.412 UTC Mar 25 2019	-684	379408
Po102	11:19:10.287 UTC Mar 25 2019	-35	379410
Po102	11:19:10.162 UTC Mar 25 2019	662	379410
Po102	11:19:10.037 UTC Mar 25 2019	-52	379410
Po102	11:19:09.912 UTC Mar 25 2019	66	379410
Po102	11:19:09.787 UTC Mar 25 2019	-15	379410
Po102	11:19:09.662 UTC Mar 25 2019	-360	379410
Po102	11:19:09.537 UTC Mar 25 2019	8	379410

- Configuring and maintaining a proper PTP distribution network is not a daunting task - plenty of material out to to review

PTP Training - 3 Part Series:

- 1st Webinar - PTP Overview
 - <https://youtu.be/7ADhoEa4ylA>
- 2nd Webinar - Best Practices and Architectures
 - <https://youtu.be/HTX3-UmRubg>
- 3rd Webinar - Commissioning and Troubleshooting
 - <https://youtu.be/tTGZMLpXozg>

The Arista PTP whitepaper:

<https://www.arista.com/assets/data/pdf/Whitepapers/ME-PTP-White-Paper.pdf>

- Consult your vendors, both broadcast and network - ask questions!

Thank You Or Any Questions?

Ryan Morris



IP SHOWCASE