Difficulty in Designing Redundant Network where PTP and The Other Services Coexist

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Need Redundancy!

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- Typical engineers in enterprise or broadcasting area desire communication redundancy.

- The whole communication is limited to the physical redundancy design.

  - ✓ Main service and PTP share the same network.
  - ✓ **SMPTE ST 2022-7** defines redundancy of video stream over IP network.

Need Redundancy!

Is the compatibility between PTP and the standard physical redundancy design so well?

We have to say

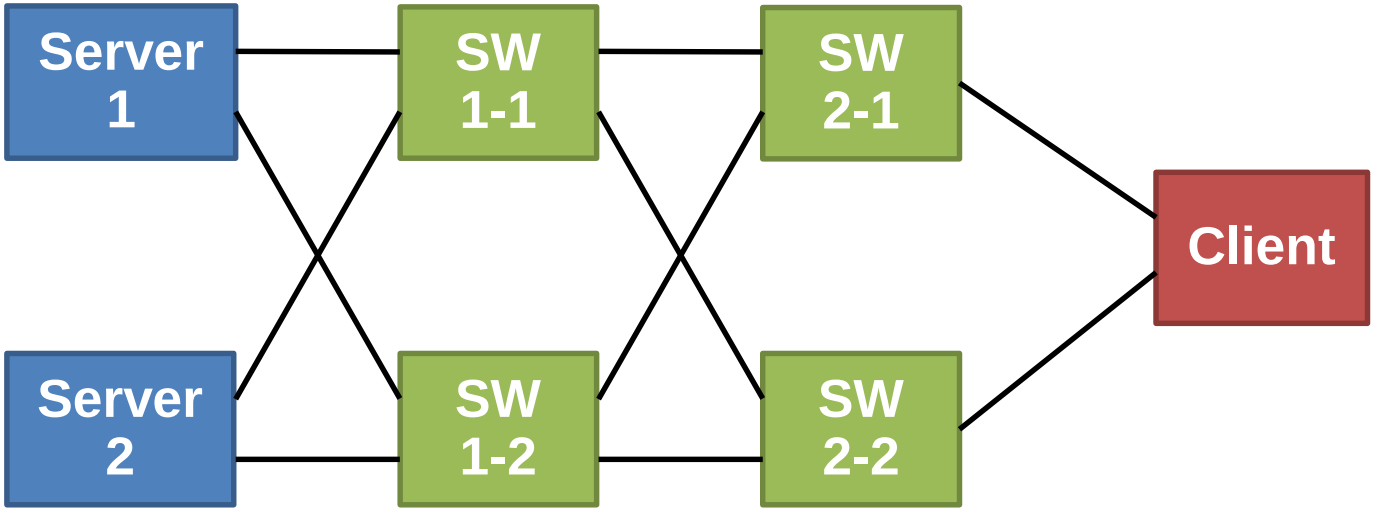
No!

at the present…

(Let me show you the details next)

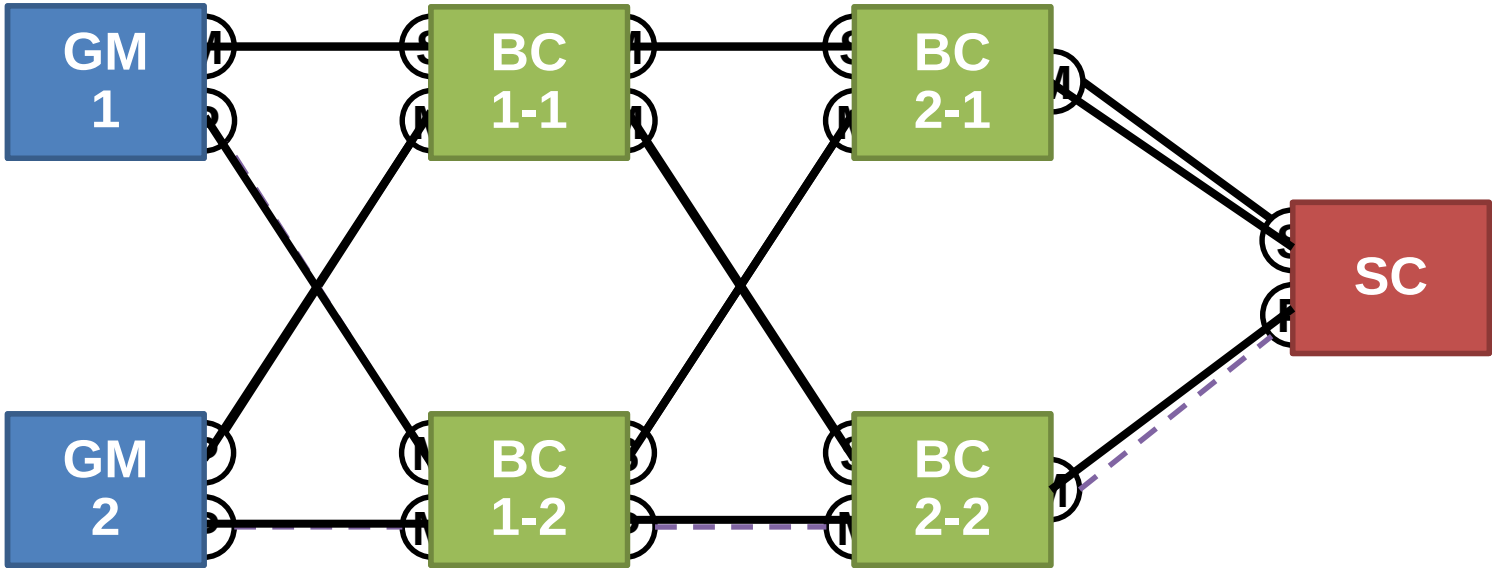
Typical Redundancy Design

So many engineers in enterprise or broadcasting area **love** the following wiring.



PTP (with BMCA) can work

BMCA detects and prunes redundant lines logically.

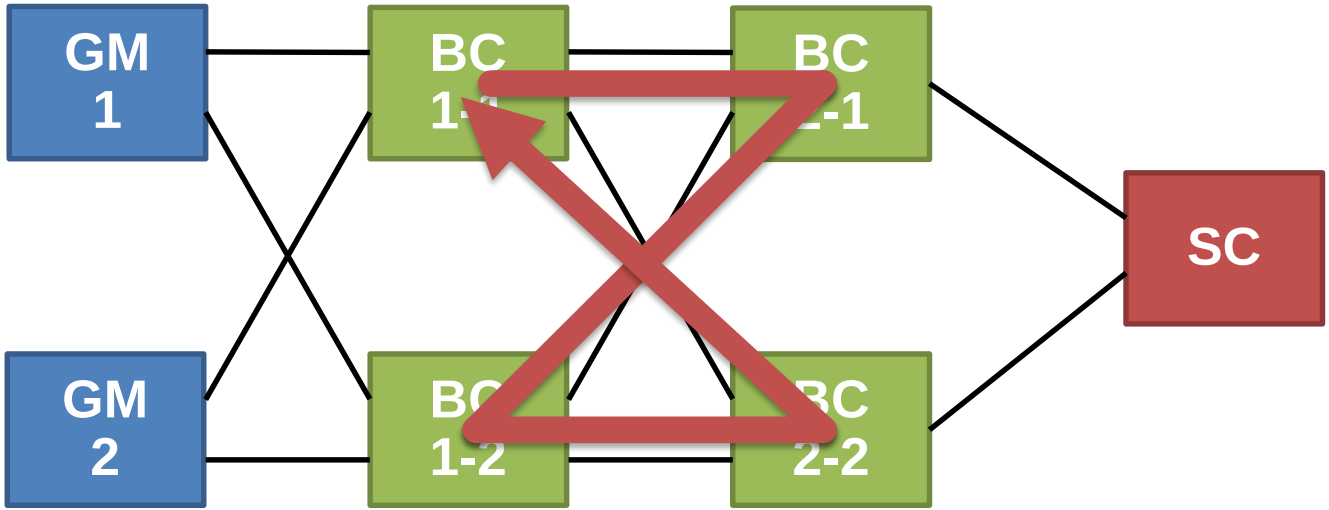


The quality order of the clocks has been considered too.

PTP (with BMCA) can work however...

What happens for **non-PTP** message on that network?

A broadcast storm probably occur.



Is mesh topology really impossible?

Can we overcome the difficulty by configuring SW?

Avoid the loop problem

A) Switching technique

- ✓ Well-known loop protection technology.
- ✓ The BC (mfr.) dependent technique.

B) An approach in the actual service

- ✓ SMPTE ST 2022-7

A) Well-known technology

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Ex: (Rapid) Spanning Tree Protocol

- Pruning redundant line logically under L2 network.

Advantage:

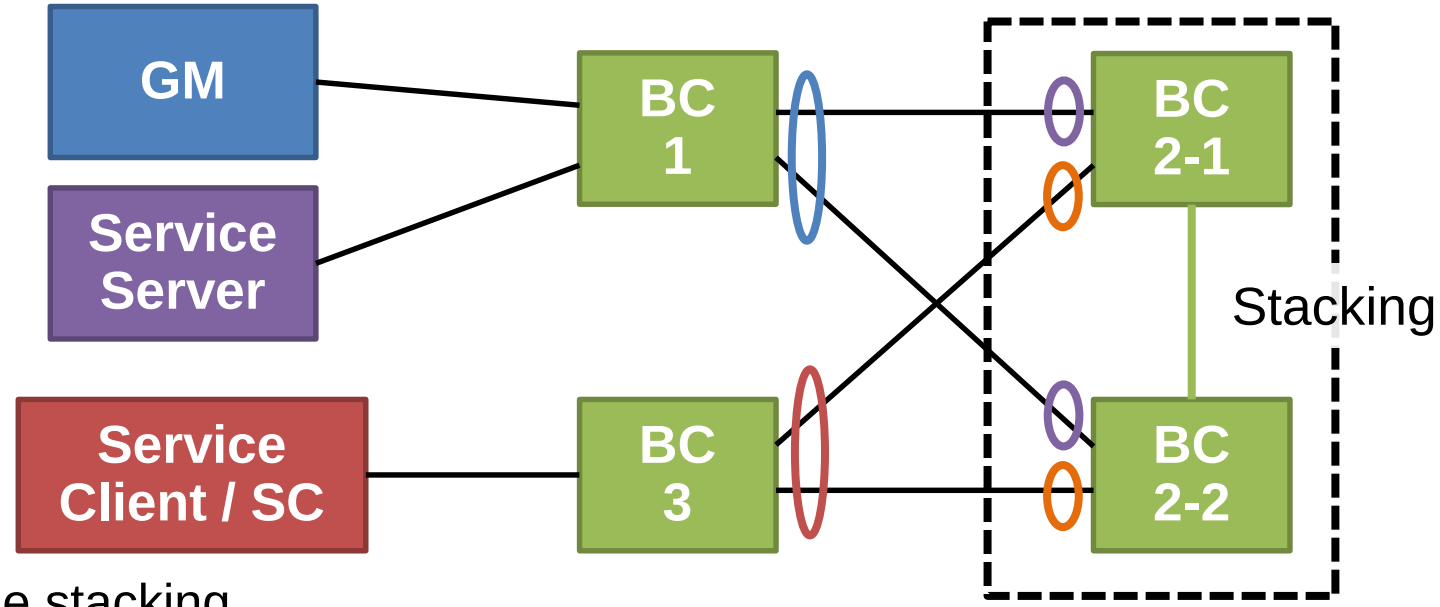
- Can handle arbitrary mesh topology.
- Manufactures independent technology.

Disadvantage:

- A few seconds LAN ports blocking.
- Cancel BMCA advantage. (Clock quality order)

A) BC (mfr.) dependent technique

Ex: Link aggregation (LAG) + Stacking



Points:

- Must use stacking
- BMCA works perfectly if
  - ✓ PTP is not affected by the LAG and stacking.
  - ✓ PTP, LAG and staking can be configured simultaneously.

A) BC (mfr.) dependent technique cont.

Advantage:

- LAN ports are always non-block.
- BMCA works perfectly.
  (If PTP is not affected by the LAG and stacking)

Disadvantage:

- Depends on manufacturer.
- Only a few topology can be applied this technique.

B) SMPTE ST 2110 overview

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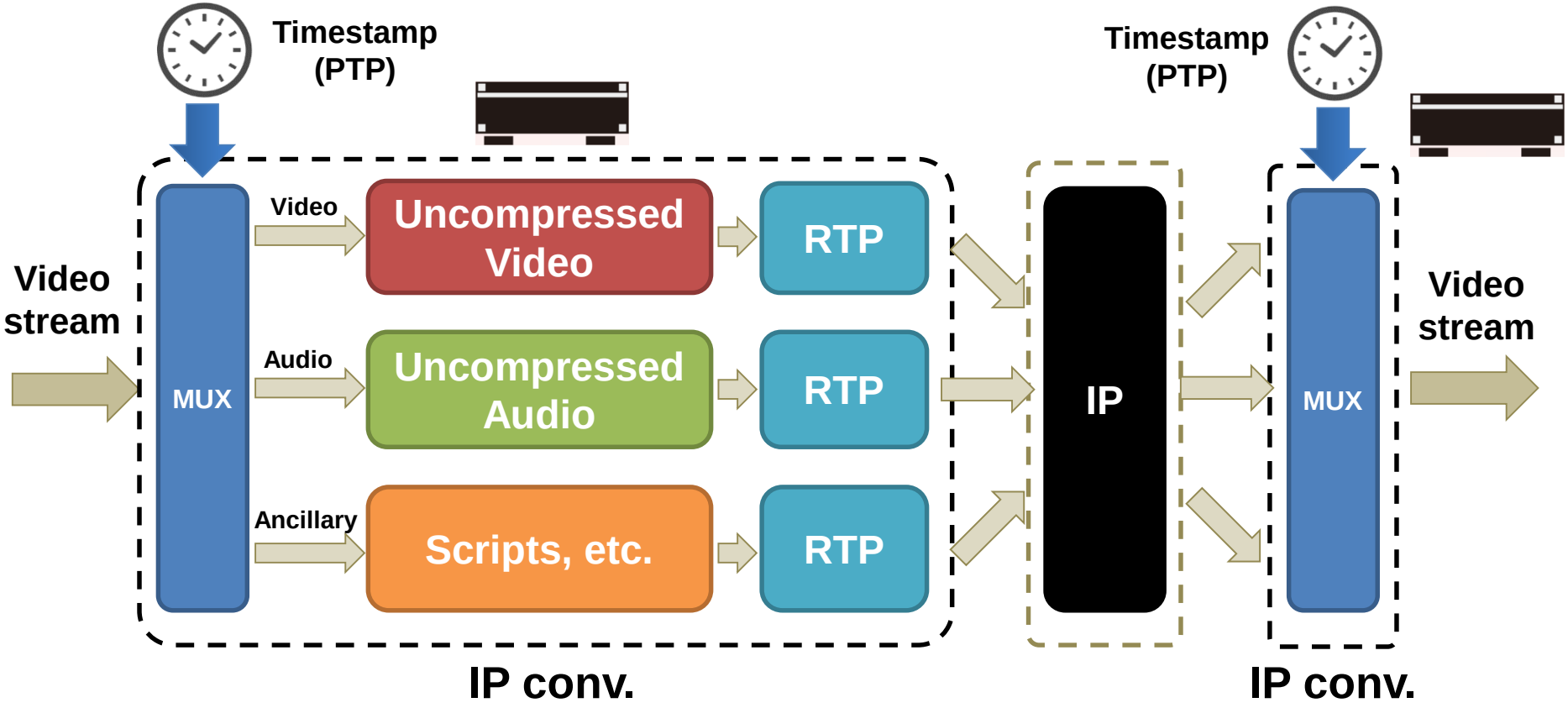
Defines video streaming for TV facilities over IP network.



B) SMPTE 2110: PTP and Redundancy

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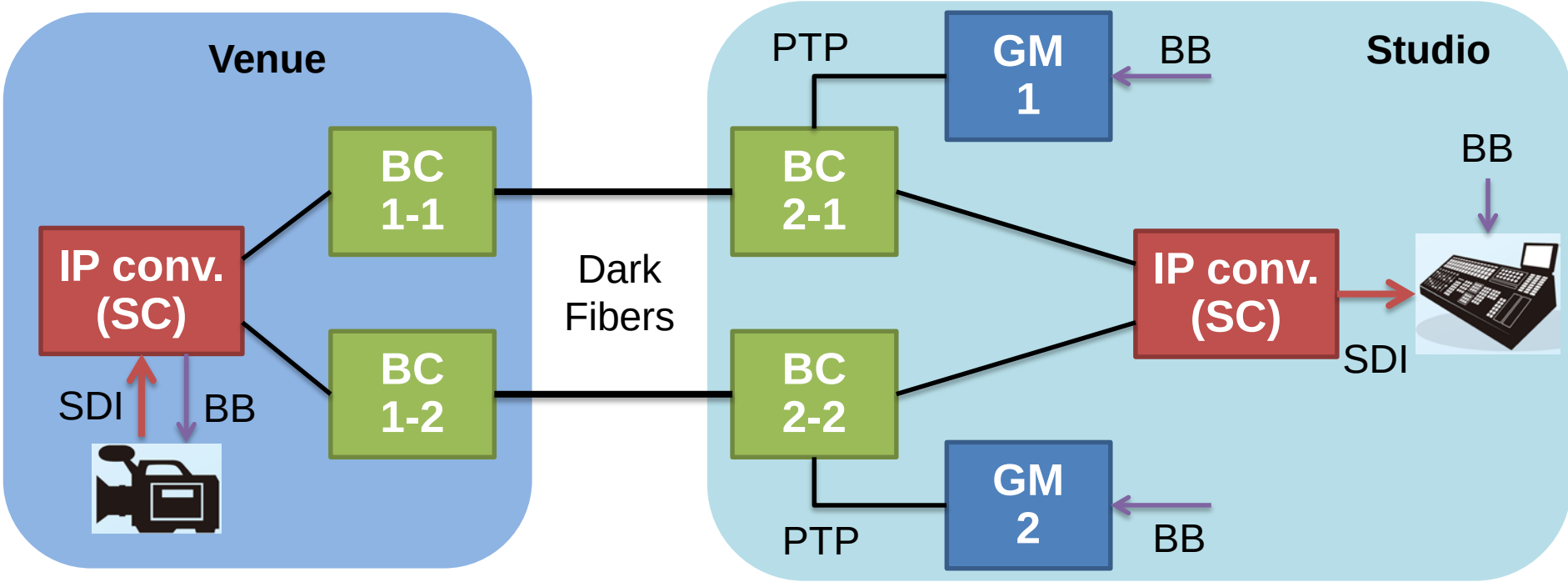
- Require PTP (ST 2059-2 profile) to synchronize each essence (video, audio and ancillary data)

- Must use ST 2022-7 when using redundant stream.
  - ✓ **Do not** drop any streaming data.

→ **Can’t use (R)STP!**

B) SMPTE ST 2022-7 Topology

Typical redundancy topology for SMPTE ST 2022-7



There is **no** mesh connection.
Video stream and PTP **share** the same network.

B) SMPTE ST 2022-7 Topology cont.

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Advantage:

- A simple topology.
  - ✓ 100% air-gap in the intermediate BCs.
- No concerns of loop.
- Easy to share the network with PTP and the other messages.
- Manufacturer independent.

Disadvantage:

- Less flexibility for physical topology design.

It is one of practical design for desired redundant network.

(However the service must involve design consideration of redundancy)

Summary

Needs:

- PTP and the other messages coexist
- Redundancy
- Many engineers attempt to construct the mesh topology first

Current solutions:

- Well-known or BC (mfr.) dependent approach
- SMPTE ST 2022-7 design

Attentions:

- Many engineers are not so familiar with PTP
- Clock quality order tend to be missed out

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