802.3 SPMD SG: TMPRs and Bridges

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Background

- Approved Objective 1

  "Define performance characteristics of a mixing segment for 10Mb/s multidrop single balanced pair networks supporting up to at least 16 nodes, for up to at least 50m reach."

- Target technologies and use cases address

  - longer reach
  - higher node counts
  - more complex topologies (e.g. a "Y" connection)
  - simple installation

- Compromise points

  - 80/20 rule
  - Technical complexity

TMPRs

802.1aj - Two-port MAC Relay

The full title of this PAR is "Standard for Local and Metropolitan Area Networks - Virtual Bridged Local Area Networks - Amendment 08: Two-port Media Access Control (MAC) Relay".

This standard specifies the function of a MAC Relay with two MACs, and the protocols and procedures to support its operation. A MAC Relay is transparent to all frame-based media independent protocols except those explicitly addressed to this device. It is remotely manageable through at least one of its external MACs, and signals a failure of either MAC's LAN through the other MAC.

The wide and growing deployment of Ethernet Provider Services has created a demand for simple two-port demarcation devices that connect two 802 media or 802 media emulations. The lack of standards for such devices, and particularly for link-loss signalling and remote diagnosis, is impeding the growth of this industry. This standard will greatly improve this situation.

Public networks represent a new and very broad application space for IEEE 802 technologies and specifically for Provider Bridges (P802.1ad) and Ethernet in the First Mile (802.3ah). Numerous vendors and potential users (the Service Providers) have expressed the need to integrate Ethernet link technologies with their existing infrastructure at a low cost, while providing the manageability and remote diagnostic capabilities traditionally offered by circuit switched technologies.
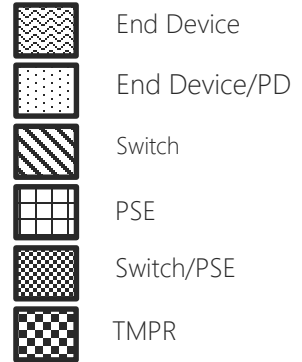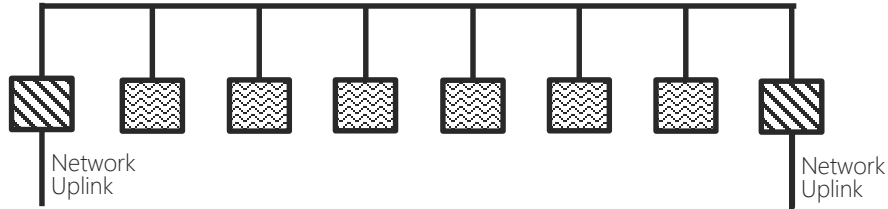
Current Status

Status	Standard approved on Dec 10th, 2009
Editor	John Messenger

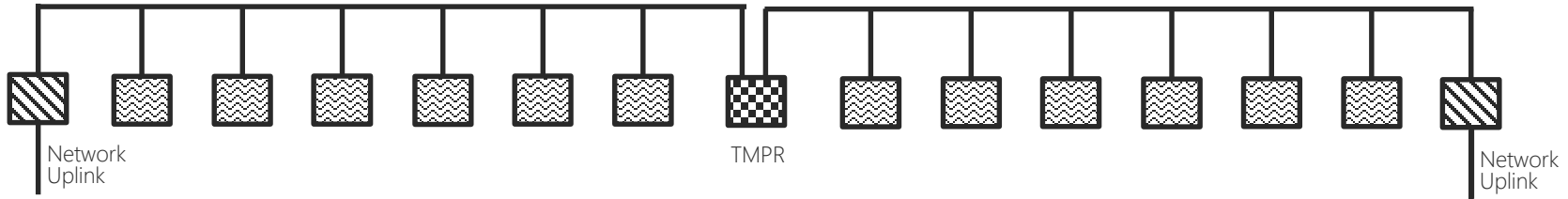# TPMR and SPE Multidrop

- TPMR is a MAC level relay

- Terminates 802.3 link

- For SPE multidrop

  - Terminates CSMA/CD collision domain

  - Terminates PLCA domain

  - Terminates power domain, could be PSE or PD/PSE
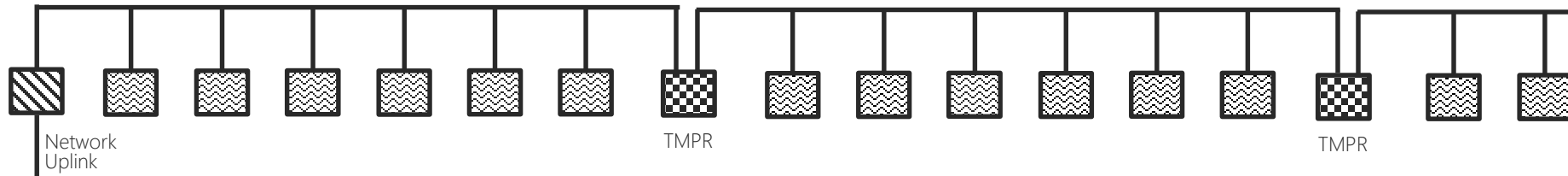
Extend Mixing Segment with TPMR(s)

Max 16 nodes/50 m

Network Uplink

Network Uplink

1 TPMR doubles node count/reach

Network Uplink

TMPR

Network Uplink

Can be extended

Network Uplink

TMPR

TMPR

End Device

End Device/PD

Switch

PSE

Switch/PSE

TMPR

Summary: Increasing Reach/Node Count

- Use of TMPR(s) enables simple extension of SPE multidrop

- TPMR is a relative simple/low cost device supported in the 802 architecture

- Simplifies finding compromise
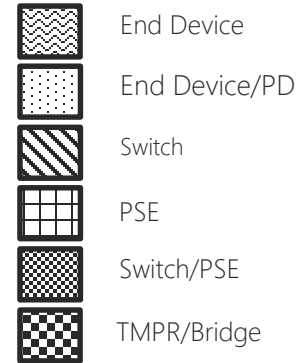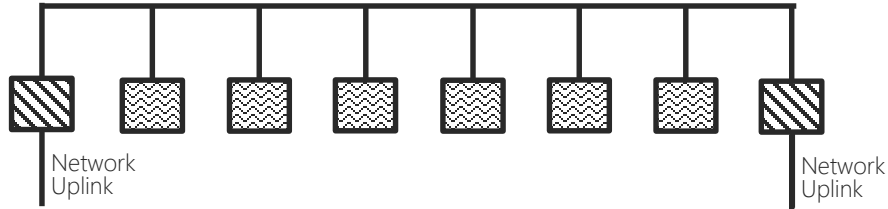
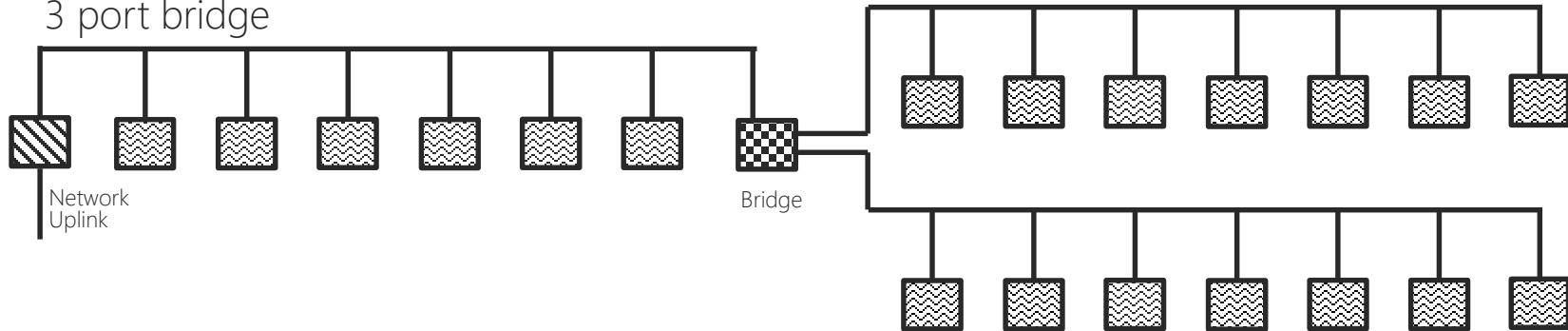- Optimize for 80%, and still address 20%

Bridges

Complex topologies

- Competing technologies (e.g., LONWORKS, DALI) support more complex topologies, e.g. huszak_01_spmd_031120.pdf slide 4

  - Optimize for 80%, and still address 20%

- A MAC Relay with > two ports is called a bridge.

- Simple Bridges don't need a lot of configuration, e.g.,

  - No PLCA/no Power – none

  - PLCA/no Power – nodeId defaults

Multidrop and bridging

Max 16 nodes/50 m

Network Uplink

Network Uplink

End Device

End Device/PD

Switch

PSE

Switch/PSE

TMPR/Bridge

3 port bridge

Network Uplink

Bridge

Summary: Complex Topologies

- Bridges enable support of most common "complex topologies"

- Complexity can be very low, e.g., single STP instance, no learning (flooding only)

- Required configuration:
  - For data without PLCA – none
  - For data with PLCA – upstream vs downstream
  - For PD/PSE - TBD

Consensus
WE BUILD IT.

SPMD Topology – ???

End Device

End Device/PD

Switch

PSE

Switch/PSE

TMPR/Bridge

Network Uplink

Network Uplink

Network Uplink

Network Uplink

Physical Topology

Network Uplink

Network Uplink

Logical Topology

Network Uplink

Network Uplink