



**SRP Infrastructure  
and ISIS**

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## SRP in a nutshell

This presentation is in response to a request for an overview of SRP internals that should be considered in an SRP + ISIS solution. There are also capabilities that would be important in SRP Gen 2 that ISIS may provide.

In normal operation SRP will proceed as follows:

- First, devices use Domain attributes to establish boundaries\* between link partners with incompatible SRP Domains,
- Next, a stream source device advertises its stream(s) with Talker Advertise messages,
- Lastly, stream sink devices use Listener Ready messages to request bandwidth reservations be established from the source.

\*Note: Link partners are in the same SRP Domain if they use the same priority for the same SR class.

## MSRP Attribute Types (clauses 35.2.2.4, 35.2.2.7.2)

- **Domain**

- Negotiate SR class A and/or B priorities and default SR class VID with link partner.

- **Talker Advertise**

- Path back to Talker has sufficient resources to support a reservation.

- **Talker Failed**

- Path back to Talker has **insufficient** resources to support the reservation. Failure Information is related to Bridge with failure that is nearest the Talker.

- **Listener**

- **Ready:** A reservation has been established along the path to every downstream Listener.

- **Ready Failed:** At least one path to a downstream Listener has a reservation and at least one path to another downstream Listener has **insufficient** resources to establish a reservation.

- **Asking Failed:** There are **insufficient** resources to all downstream Listeners and no reservation has been established.

## MSRP Attribute Propagation (Clauses 35.2.4.3, 35.2.4.4)

- Listener Ready combinations and propagation
  - Listener **Ready** + Listener **Asking Failed** -> Listener **Ready Failed**
  - Listener **Ready** + Listener **Ready Failed** -> Listener **Ready Failed**
  - Listener **Ready Failed** + Listener **Asking Failed** -> Listener **Ready Failed**
- **Reservation created**
  - Talker **Advertise** + Listener **Ready** = **Reservation**
  - Talker **Advertise** + Listener **Ready Failed** = **Reservation**
- **No Reservation**
  - Talker **Advertise** + Listener **Asking Failed** = **No Reservation**
  - Talker **Failed** + Listener (**Ready**, **Ready Failed**, **Asking Failed**) = **No Reservation**

## SRP Talker Advertisements (clause 35.2.2.8)

- Static across network
  - StreamID (48-bit MAC + 16-bit UniqueID)
  - StreamDA (multicast or locally-administered unicast)
  - VLAN (used by MVRP to create VLAN between Talker and Listener(s))
  - Traffic Specification
    - Maximum frame size
    - Maximum # frames per interval (A = 125us, B = 250us)
  - Priority (-> PCP)
  - Rank (emergency vs. non-emergency)
- Calculated and/or adjusted per hop
  - Accumulated latency
  - Failure Information: Bridge ID and Failure Code where Talker Advertise -> Failed

## Causes of Talker Failed (clause 35.2.2.8.7)

- Insufficient bandwidth
- Insufficient Bridge resources
- Insufficient bandwidth for Traffic Class
- StreamID in use by another Talker
- Stream destination\_address already in use
- Stream preempted by higher rank
- **Reported latency has changed\***
- Egress port is not AVB capable
- Use a different destination\_address (i.e. MAC DA hash table full)
- Out of MSRP resources
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- Cannot store destination\_address (i.e., Bridge is out of MAC DA resources)
- Requested priority is not an SR Class (3.3) priority
- MaxFrameSize [35.2.2.8.4 a)] is too large for media
- msrpMaxFanInPorts [35.2.1.4 f)] limit has been reached
- **Changes in FirstValue for a registered StreamID**
- VLAN is blocked on this egress port (Registration Forbidden)
- VLAN tagging is disabled on this egress port (untagged set)
- SR class priority mismatch

\*Need to address latency changes with regards to network reconfiguration.

## Stream Age (35.2.1.4c) – internal bridge variable

Synopsis: Number of seconds the stream has been active on this port. Bridges have the information to recreate the correct connections, but this information is local to each bridge. This information is lost when routes through the network change because of reconfiguration.

Definition: A per-port per-stream 32-bit unsigned value used to represent the time, in seconds, since the control element for the associated port most recently became forwarding in the Dynamic Reservations Entries (8.8.7) corresponding to the stream's `destination_address`. This value is used when determining which streams have been configured the longest. Streams with a numerically larger *streamAge* are considered to be configured earlier than other streams, and therefore carry a higher implicit importance.

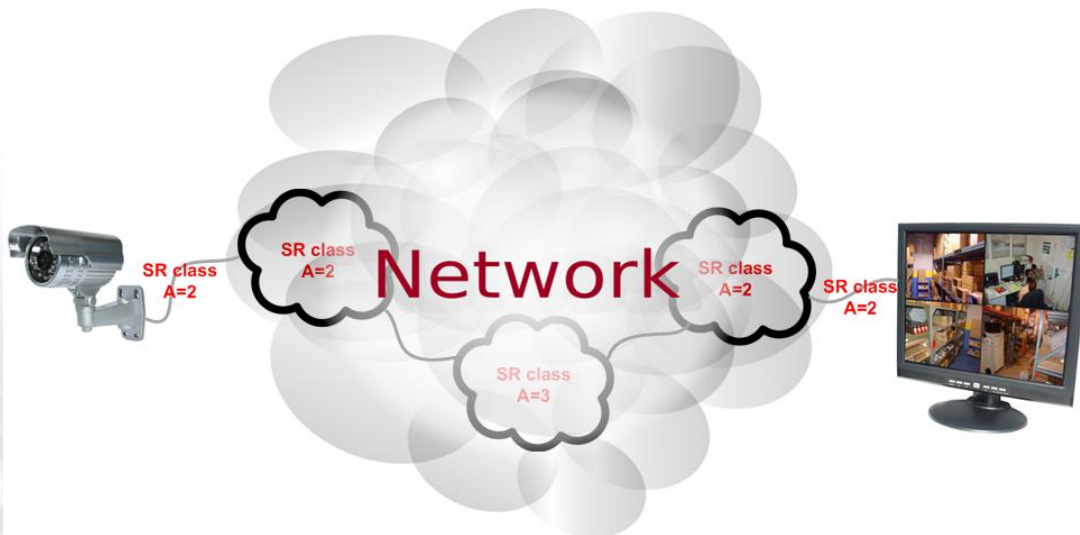
## **SRP Gen2 Issues to Address**





## SRP Domain 2-3-2 challenge

A reservation  
seems possible:



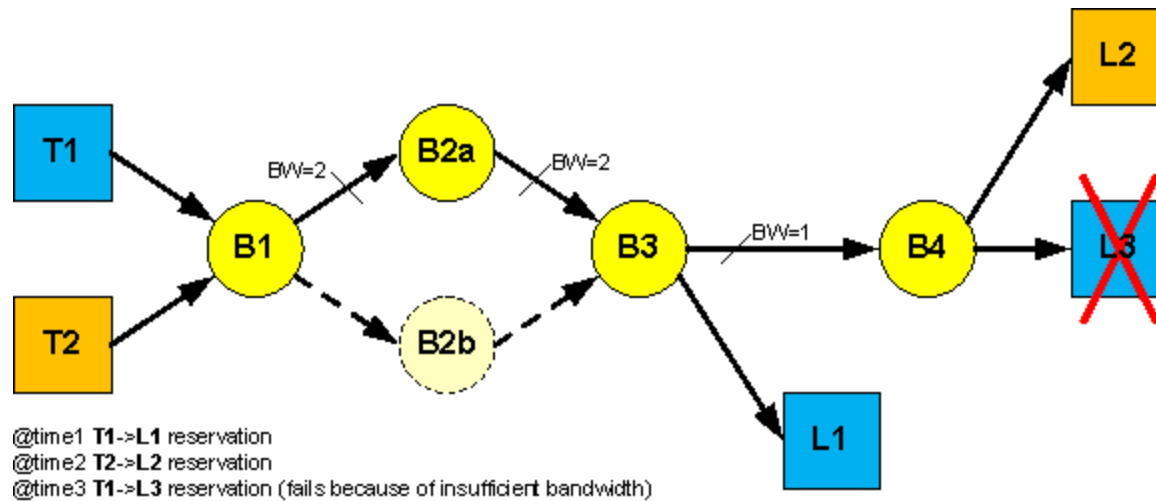
Reservation fails  
because there are two  
Domain Boundaries  
hidden in the cloud

## Network Reconfiguration

- Goal: **Deterministic recovery** – Listeners that were active before the reconfiguration are active after the reconfiguration.
- Should be based on when Listeners attach to advertised streams – similar to a globally known Stream Age per Bridge Port.
  - If there are no Listeners for a Talker’s stream then it doesn’t matter when the Talker’s stream was advertised, so don’t waste resources tracking the time.
  - If there is no Talker for the Listener’s “Ready” then it doesn’t matter when the Listener requests the stream, so don’t waste resources tracking the time.
  - A Talker can have multiple Listener’s, some of which have been attached for days and others that may or may not have been able to attach recently.

# Network Reconfiguration

Initially three reservation attempts are made, but the third fails because of insufficient bandwidth on the B3 to B4 link.



After a network reconfiguration where the B1->B2a->B3 path is replaced by the B1->B2b->B3 path we don't want T1->L3 to succeed and take the bandwidth away from T2->L2.

## Other SRP Gen 2 considerations

- Gen 2 bridges should interoperate with Gen 1 end stations
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- Gen 2 end stations are optional and should be supported as well
- Redundancy
- Remove overhead of MRP
  - Packet size limits the number of non-contiguous streams (318-530) that can be advertised in the LeaveAllTimer (10-15sec) LeaveTime (600-1000ms) response window\*
  - LeaveAll mechanism causes entire database to be redeclared
- AVB Assumptions document contains additional features (<http://www.ieee802.org/1/files/public/docs2012/avb-pannell-gen2-assumptions-0512-v10.pdf>)

\*See: <http://www.ieee802.org/1/files/public/docs2010/at-cgunther-mrp-timers-0310-v02.pdf>




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