# MRP Timers
## Maximum attribute registrations

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# Problem statement

Obviously there are limits to the number of MSRP attributes a bridge or end-station can support.  This is based on criteria you would expect: memory, CPU performance, bandwidth between CPU and switch fabric, etc.

There is also a worst-case limit based on the MRP timers and the LeaveAllEvent mechanism.  Worst-case is defined as non-contiguous attributes that do not take advantage of the FirstValue + NumberOfValues condensed packing (i.e. worst = one attribute per Vector Attribute).

The purpose of this presentation is to explore the LeaveAllEvent and PeriodicTimer limits.
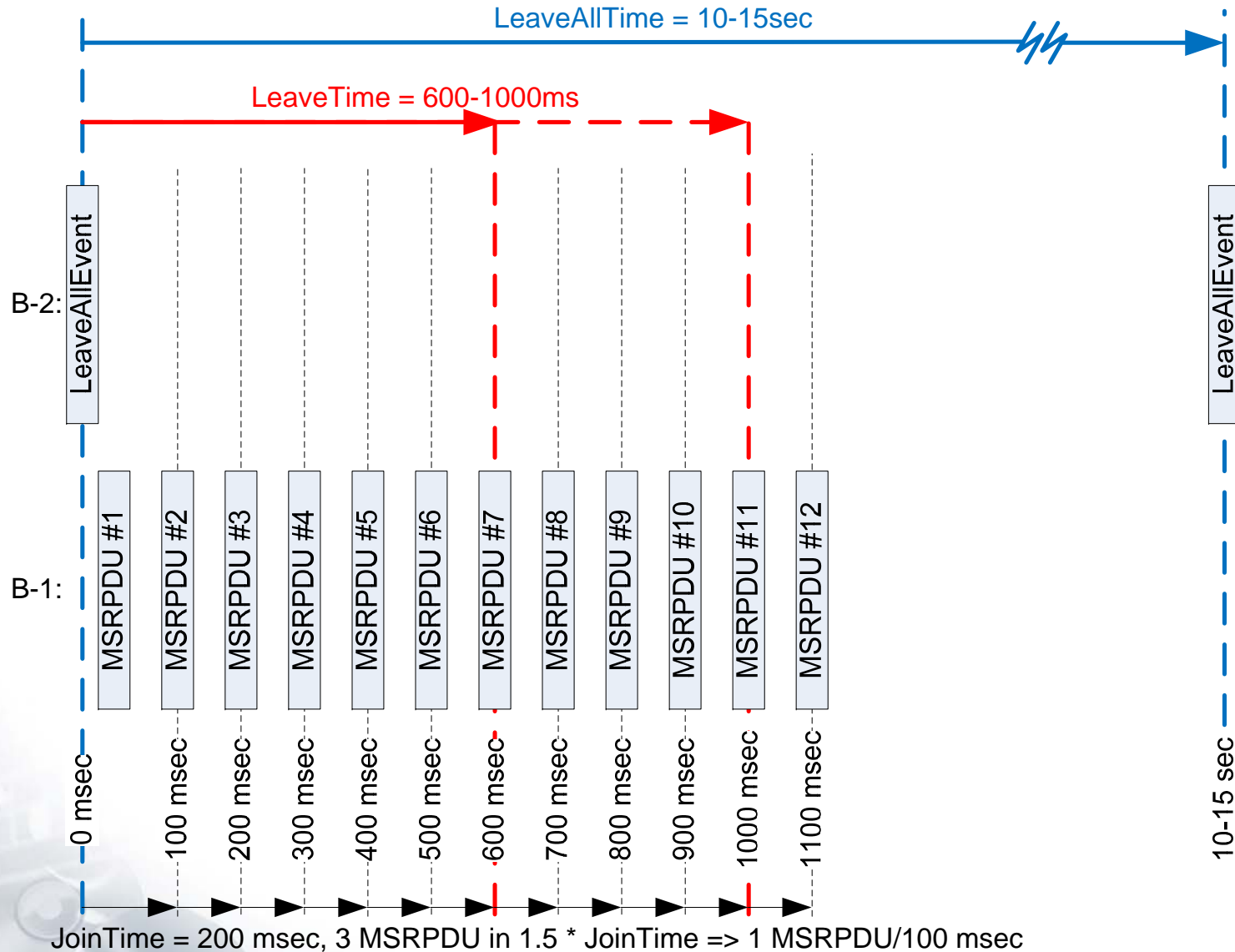
# Concepts to understand

- Table 10-7 – MRP "default" timer parameter values:
  - JoinTime = 20 centiseconds (200ms)
  - LeaveTime = 60-100 centiseconds (600-1000msec)
  - LeaveAllTime = 1000 centiseconds (10 seconds)

- Clause 10.7.11 Timer values: If operPointToPointMAC (6.4.3) is TRUE, a request for a transmit opportunity should result in such an opportunity as soon as is practicable, given other system constraints, and shall occur within the value specified for JoinTime (200 msec in Table 10-7) subject to not more than three such transmission opportunities occurring in any period of 1.5*JoinTime.

- Clause 10.8.2.4 Encoding of LeaveAllEvent: The LeaveAllEvent is interpreted on receipt of a MAD Leave All event to be applied to the state machines for all Attributes of the type defined by the AttributeType field.

- Table 35-1 – MSRP AttributeType Values: Talker Advertise, Talker Failed, and Listener.

- Clause 35.2.3.1: SRP uses MMRP for Talker Pruning.

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# A worst-case example

The following slide describes the MRP communications between two bridges and the relationship of the various MRP timers from Table 10-7.  Bridge B-1 has declared several attributes to Bridge B-2.  Bridge B-2 is issuing a LeaveAllEvent to Bridge B-1 and Bridge B-1 is re-declaring its attributes.

Any attributes not re-declared before the LeaveTime (600-1000msec) expiration will be transition to the LV state by Bridge B-2, which effectively removes those attributes from the bridge.  MSRPDU #12 is such a failure.  MSRPDU #11 is most likely going to be a failure as well.

# MRP LeaveAllEvent and associated timers



LeaveAllTime = 10-15sec

LeaveTime = 600-1000ms

B-2: LeaveAllEvent

B-1:

MSRPDU #1
MSRPDU #2
MSRPDU #3
MSRPDU #4
MSRPDU #5
MSRPDU #6
MSRPDU #7
MSRPDU #8
MSRPDU #9
MSRPDU #10
MSRPDU #11
MSRPDU #12

LeaveAllEvent

0 msec
100 msec
200 msec
300 msec
400 msec
500 msec
600 msec
700 msec
800 msec
900 msec
1000 msec
1100 msec

10-15 sec

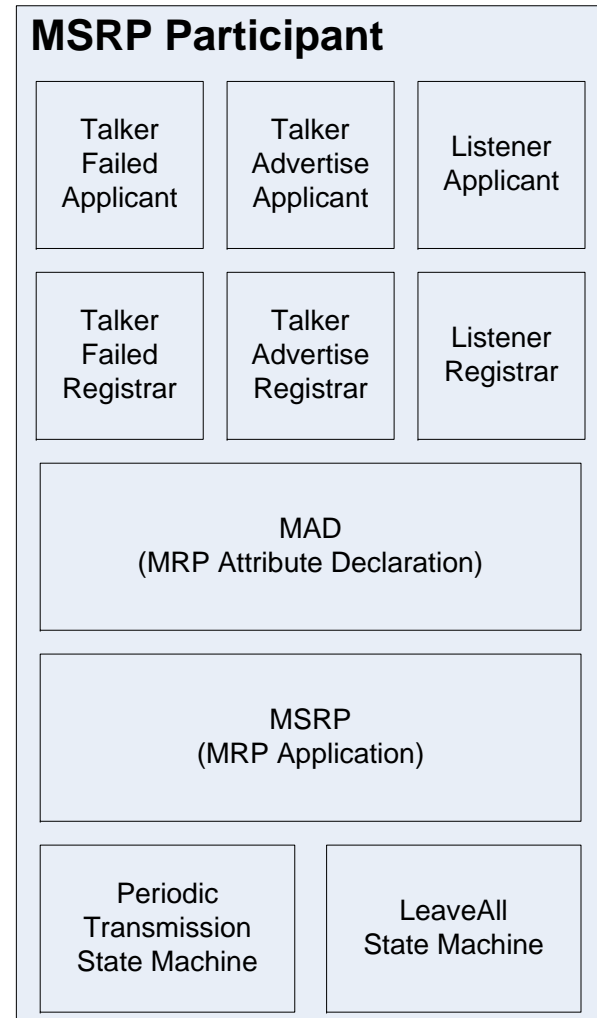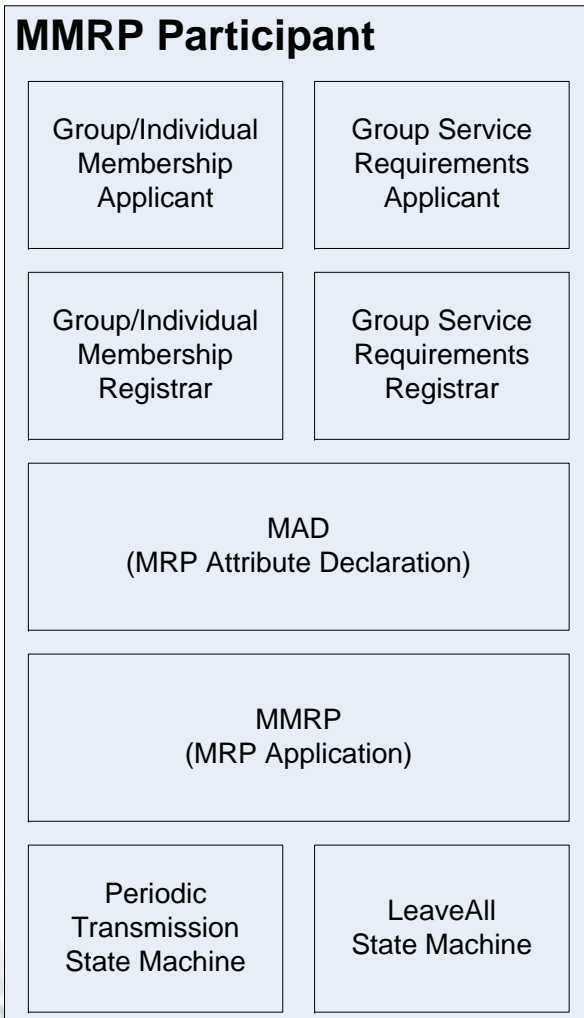JoinTime = 200 msec, 3 MSRPDU in 1.5 * JoinTime => 1 MSRPDU/100 msec

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# How many attributes in 10 MSRPDUs?

- We should be able to reliably receive 10 MSRPDUs in 1 second (default LeaveTime)

- How many SRP attributes in 10 MSRPDUs:

  - 40 Talker Failed (1507 octets)/MSRPDU = 400 Talker Failed attrs

  - 53 Talker Advertise (1511 octets)/MSRPDU = 530 Talker Advertise attrs

  - 135 Listener Ready (1512 octets)/MSRPDU = 1350 Listener attrs

  - 165 Talker Pruning (1512 octets)/MSRPDU = 1650 Talker Pruning attrs

# How to cause inconsistent behavior

- This scenario will cause multiple streams to be dropped when we only want to drop one:

  - Advertise 529 separate Talker Advertise attributes (max=530)

  - Advertise the 530th Talker Advertise attribute which is really made up of 11 contiguous streams.

  - Tear-down the 2nd stream of the 11 contiguous streams, which now splits the 11 contiguous into a single stream plus 9 contiguous. This results in 531 Talker Advertise declarations and something must be dropped, and it could very likely be 9 of the 11 streams that were just brought up.

- Can we derive a formula so bridge can report an out of resources failure when the limit is hit?

# MRP Participants

**MMRP Participant**

| Group/Individual Membership Applicant | Group Service Requirements Applicant |
|---|---|
| Group/Individual Membership Registrar | Group Service Requirements Registrar |

MAD
(MRP Attribute Declaration)

MMRP
(MRP Application)

| Periodic Transmission State Machine | LeaveAll State Machine |
|---|---|

**MSRP Participant**

| Talker Failed Applicant | Talker Advertise Applicant | Listener Applicant |
|---|---|---|
| Talker Failed Registrar | Talker Advertise Registrar | Listener Registrar |

MAD
(MRP Attribute Declaration)

MSRP
(MRP Application)

| Periodic Transmission State Machine | LeaveAll State Machine |
|---|---|

# How to get more attributes

- Utilize contiguous StreamID + StreamDA which removes the worst-case.

- Don't combine LeaveAllEvent for TalkerAdvertise + TalkerFailed + Listener in a single frame.  Send TalkerAdvertise LeaveAllEvent, then 5 seconds later send TalkerFailed LeaveAllEvent, then 5 seconds later send Listener LeaveAllEvent.  Then multiple attributes do not compete for PDU space in the same 10 frames.

- Modifications to 802.1ak

  - Shorten JoinTime  (200msec). 802.1ak allows timer modifications per Participant.

  - Lengthen LeaveTime (600-1000msec).  We would also have to address the problem of the LeaveTime bumping into the optional Periodic Timer (re-declare your attributes every second).  802.1ak allows timer modifications per Participant.

  - Modify the "1.5 * JoinTime" limit when responding to the LeaveAllEvent.

  - Require two LeaveTime expirations which would allow us to re-declare half our attributes one time and half the next, effectively doubling the number of attributes.

  - Add some type of shortcut that allows for less octets to re-declare vs more octets for initial declaration.

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# The Solution

- Do not use optional Periodic Timer for MSRP. 10x to 15x decrease in number of frames exchanged.

- Use at least a15 second LeaveAllEvent timer.

- Lengthen LeaveTime, which allows more MSRPDUs to be received during a LeaveAllEvent.  What should be the new value?  Should 802.1BA specify this?

- Shorten JoinTime, which also allows more MSRPDUs to be received during a LeaveAllEvent .  What should be the new value?  Should 802.1BA specify this?

- An implementation may choose to cache egress MSRP packets for less CPU overhead during declaration processing if MAD (MSRP Attribute Database) does not change.

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