

A blurred photograph of a modern office hallway with large glass windows and a central revolving door. Several people in business attire are walking through the hallway, their figures slightly out of focus to convey a sense of movement and activity.

SIEMENS

Proposal for splitting IEEE 802.1Qcc into several PAR's

MRP++ Transport Protocol for Registration **MSP Transport Protocol for Reservation**

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.1Qcc PAR

Scope of the project:

This amendment describes new protocols, procedures and managed objects for bridges and end stations, which are compatible with existing mechanisms, and provide:

- Support for more streams. The current worst case limit is less than 500 streams; there are use cases that require two orders of magnitude greater than this.
- Mechanisms that allow Stream Reservation class (SR class) parameters to be configured
- Inclusion of additional parameters and mechanisms in the stream reservation protocol that support additional applications, such as higher reliability, latency requirements, and latency changes due to network reconfiguration.
- Support for higher layer streaming sessions, such as Real-Time Protocol (RTP)-based sessions.
- Deterministic stream reservation convergence.
- User Network Interface (UNI) for routing and reservations.

Motivation splitting Registration and Reservation in MRP++ (MRPv2) and MSP

Motivation for V2 MRP (Multiple Registration Protocol) and V1 MSP (Multiple Signaling Protocol)

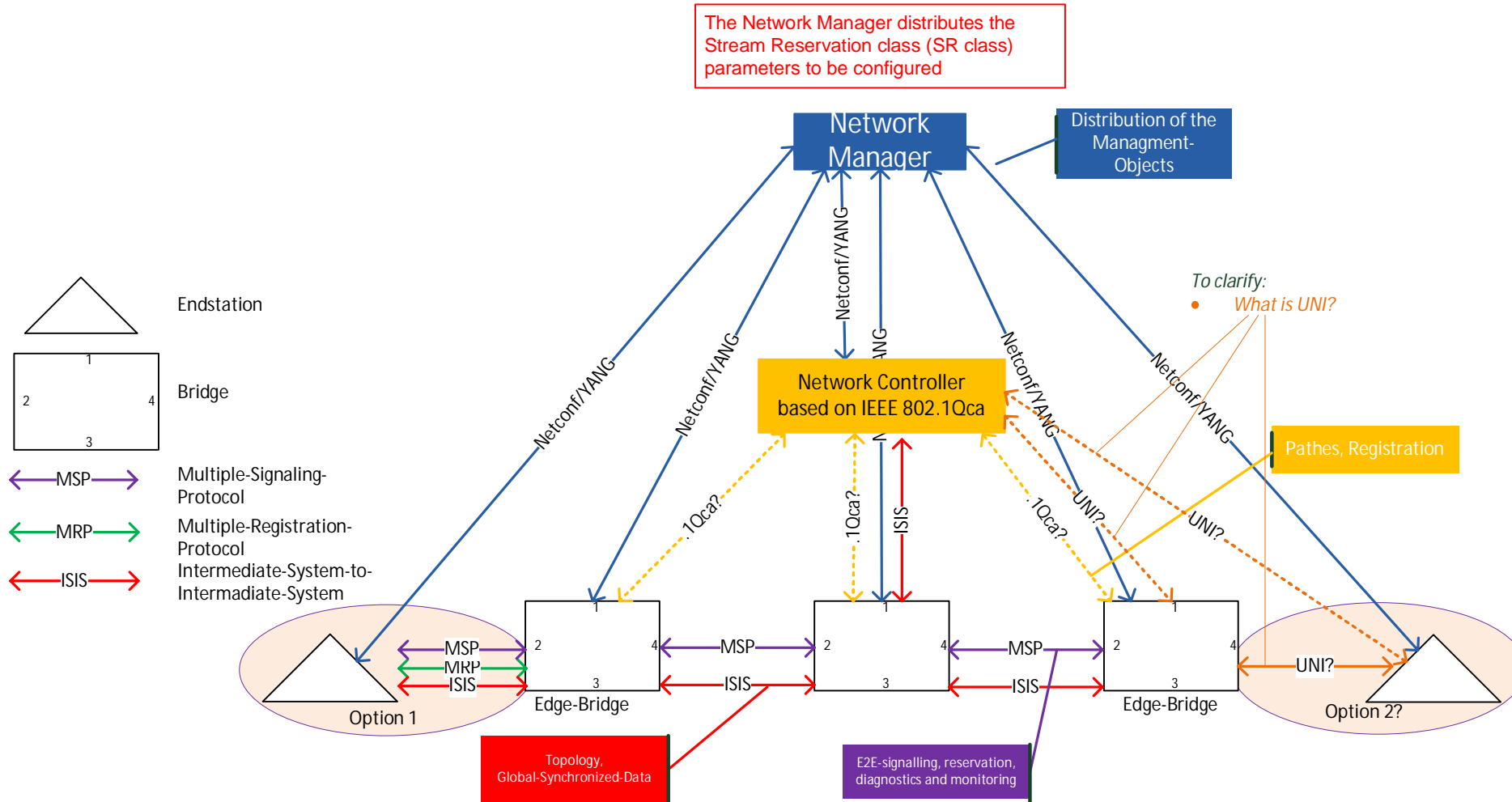
| MRP v1 | | MRP v2 "transport-protocol" for applications like MVRP, MMRP, MSRP, ... |
|--|--|--|
| Pro (also Supported by new Version) | Cons | Features |
| Distribution of network attributes over context | No fragmentation - limits the number of attributes. This problem is partly solved by spending one separate frame for each application or application instance. The disadvantage of the current solution that high computing power is required for serialization and deserialization. | + ' Support Fragmentation + ' One MRP frame for all applications (including all attribute lists and states) + ' Separate checksum for each attribute list |
| One basic mechanism for different applications (MVRP, MMRP, ...) Common architecture (application->instance->attribute) | Very complex and intransparent state machines -> difficult to synchronize implementations from different vendors | + ' Simplified state machine and synchronization mechanism |
| | MSRP combines registration and reservation, the attribute size (advertise) is very large and extended the MAP mechanism and introduced four packed events exclusively for MSRP | + ' MSRPv2 is only a registration protocol to register stream attributes (e.g. TSpec, TC, SR-DA, SR-ID, VID, ...) |
| | The pack mechanism from MRP is not practical (only for special use cases) | + ' By introducing fragmentation the packed mechanism is no longer necessary |
| | | + ' Extending existing applications (MVRP, MMRP, MSRP) to support redundancy and seamless redundancy on precalculated trees + ' If necessary add a new application like MRRP |
| | | + ' Optional support for higher layers like IP (e.g. transport higher layer addresses, QoS specifier, ...) by e.g. using TLV's |
| | | + ' Managed Objects |
| | | + ' TLV's are used to specify the MRP attributes |
| | | + ' The mechanism to synchronize the attribute list on a link is comparable to the synchronization mechanism used by ISIS (ISIS-like) |
| | | MSP ("RSVP like") ("MSP is a separate transport-protocol" for e.g. stream reservation) |
| | MSRP combines registration and reservation, the attribute size (advertise) is very large and extended the MAP mechanism and introduced four packed events exclusively for MSRP | + ' MSSP (Multiple Stream Signaling Protocol) is a application for MSP which is used for stream reservation, e2e signalling and diagnostic. The context, which is required for forwarding the signal / reservation, is either built by MRP or ISIS-PCR |
| | | + ' Optional support for higher layers like IP (e.g. transport higher layer addresses, QoS specifier, ...) by e.g. using TLV's |
| | | + ' Managed Objects |

Support for more streams. The current worst case limit is less than 500 streams; there are use cases that require two orders of magnitude greater than this.

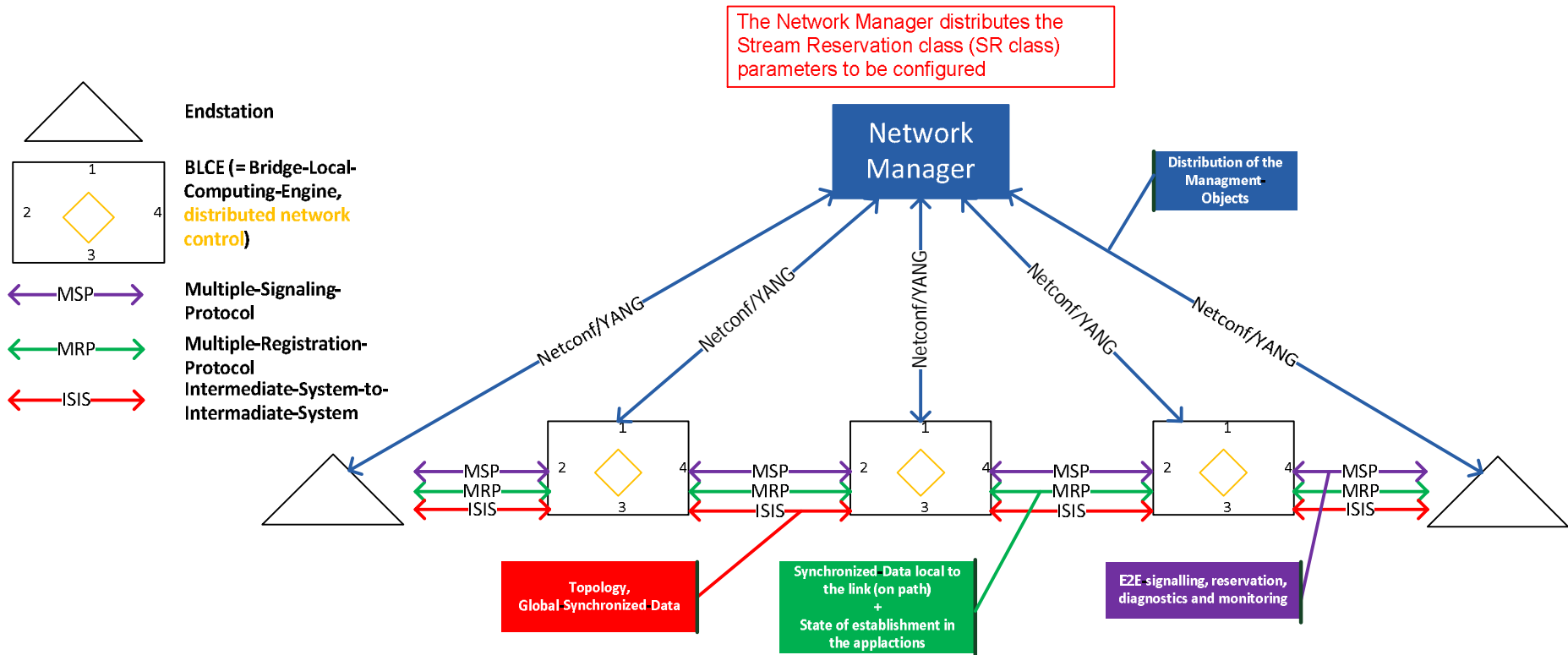
Support for higher layer streaming sessions, such as Real-Time Protocol (RTP)-based sessions

Deterministic stream reservation convergence -> request for performance

Centralized controlled Network with Path Computation, Registration & Reservation



Decentralized Controlled Network with Path Computation, Registration & Reservation



Proposals for new PARs (1)

Today:

MRP – Multiple Registration Protocol
 (framework for all MPR applications
 (e.g. MVRP, MMRP, ...) to register
 network attributes)

- **MRRP – Multiple Relation Registration Protocol**
 (used to register relation ID's and to nail down the path in combination with BLCE's)
- **MVRP – Multiple VLAN Registration Protocol**
 (used to register VID's – e.g. data plane for Streams)
- **MMRP – Multiple MAC Registration Protocol**
 (used to register MAC addresses or "Group Filtering Behavior")
- **MSRP – Multiple Stream Reservation Protocol**
 (used to register streams and make the reservation)

PAR- Proposal for .1Qcc

PAR 1: New definition of .1Qcc

- **Maintenance for the existing MSRPv1 protocol and creating YANG modules for Clause 12 specs and**

PAR- Proposals for MRP++ and MSP

PAR 2: MRP++

- **MRRP – Multiple Relation Registration application**
 (used to register relation ID's and to nail down the path in combination with BLCE's)
- **MVRP – Multiple VLAN Registration application**
 (used to register VID's – e.g. VID used for Streams)
- **MMRP – Multiple MAC Registration application**
 (used to register "Group Filtering Behavior" or to register MAC addresses)
- **MSRP – Multiple Stream Registration application**
 (used to register (no reservation) streams)

MRP++ - Multiple Registration Protocol
 (Transport protocol for all MPR applications to register network attributes)

PAR 3: MSP

- **MSSP – Multiple Stream Signalling application**
 (used to Do stream reservation)

MSP - Multiple Signalling Protocol (related to RSVP)
 (Transport protocol for all MSP applications to do reservations)

Inclusion of additional parameters and mechanisms in the stream reservation protocol that support additional applications, such as higher reliability, latency requirements, and latency changes due to network reconfiguration

Just for Interest!

SEE NEXT SLIDES!!!

Proposals for new PARs (2)

Other PAR-Proposals

(contributed by
Rodney Cummings)

PAR 4: „device level“ YANG modules

- „This specifies YANG modules for 802.1Q Clause 12. This is the bottom level YANG (per bridge).“

PAR 5: „service level“ YANG modules

- This is high level YANG (topology-wide)
- There is an IETF I-D on this topic:
<https://datatracker.ietf.org/doc/draft-clemm-i2rs-yang-network-topo>
If we assume this I-D will proceed to RFC, 802.1's role would be to specify an "augment" to this module for 802.1Q bridges. The augment should connect the top-level to the bottom-level.

Split the existing MSRP to MSRP / MRP++ and MSSP / MSP

| |
|---------------------|
| New |
| Static Information |
| Dynamic Information |

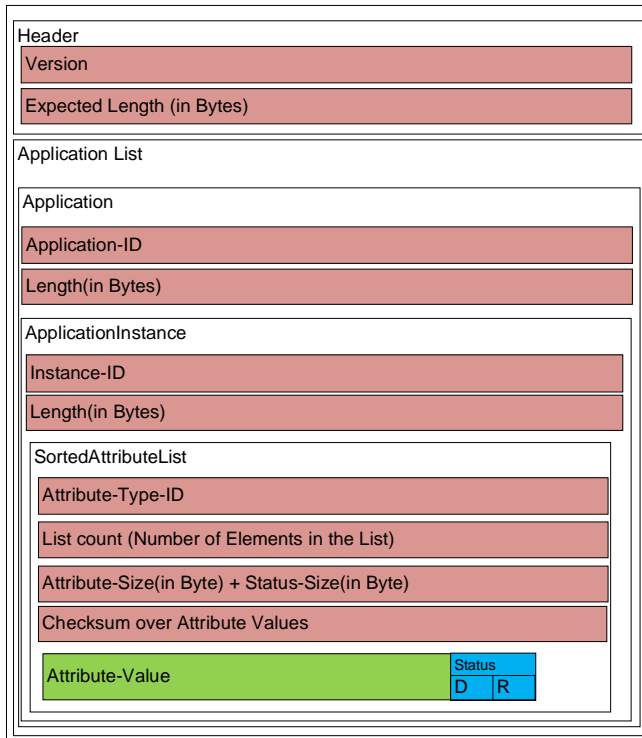
| | <i>Talker Advertise</i> | | <i>Talker Failed</i> | | <i>Listener</i> | | <i>Domain</i> |
|----------------------------|----------------------------|---------------------------|----------------------------|-------------------|------------------------|----------------|----------------------------|
| MSRP on MRP | StreamID | Talker Sys-ID | StreamID | Talker Sys-ID | StreamID | Talker Sys-ID | StreamClassID |
| | | Unique-ID | | Unique-ID | | Unique-ID | StreamClassPriority |
| | DataFrameParameters | Dest-Address | DataFrameParameters | Dest-Address | FourPackedEvent | Ready / | StreamClassVid |
| | | VID | | VID | | ReadyFailed / | |
| | Tspec | MaxFrameSize | Tspec | MaxFrameSize | | AskingFailed / | |
| | | MaxInterval | | MaxInterval | | Ignore | |
| | PriorityAndRank | DataFramePriority | PriorityAndRank | DataFramePriority | | | |
| | Rank | | Rank | | | | |
| AccumulatedLatency | portTxMaxLatency | AccumulatedLatency | portTxMaxLatency | | | | |
| | | FailureInformation | BridgeID | | | | |
| | | | FailureCode | | | | |

| | <i>Talker Advertise</i> | | <i>Listener</i> | | <i>Domain</i> |
|--------------------------------|----------------------------|---------------|--------------------|-----------------|-----------------------|
| MSRPv2 on MRP++ | StreamID | Talker Sys-ID | StreamID | Talker Sys-ID | StreamClassID |
| | | Unique-ID | | Unique-ID | Unique-ID |
| | DataFrameParameters | Dest-Address | Rspec | MinRecvInterval | StreamClassVid |
| | | VID | Listener ID | Listener Sys-ID | |
| Tspec | MaxFrameSize | | | | |
| | MaxInterval | | | | |
| PriorityAndRank | DataFramePriority | | | | |
| | Rank | | | | |

| | | | | | |
|---------------------------------------|---|---------------------------------------|--|--------------------|--|
| MSSP on MSP | StreamID | Talker Sys-ID | StreamID | Talker Sys-ID | |
| | | Unique-ID | | Unique-ID | |
| | AccumulatedLatency (Calculated downstream) | portTxMinLatency | RequiredLatency (Calculated upstream) | portRxMinLatency | |
| | | portTxMaxLatency | | portRxMaxLatency | |
| | State | ok? | AccumulatedRspec | AccMinRecvInterval | |
| List<FailureInformation> | BridgeID | State | Ready / ReadyFailed / Failed | | |
| | FailureCode | List<FailureInformation> | BridgeID | | |
| | | | FailureCode | | |

MRP++ Frame Format

Frame:



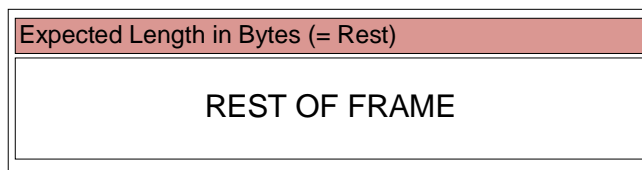
| | |
|---------------------|---|
| MRP-PDU | → Header, ApplicationList |
| Header | → Version, ExpectedLength |
| Version | → UINT8 |
| ExpectedLength | → Length |
| Length | → UINT16 |
| ApplicationList | → Application* |
| Application | → <i>ApplicationId</i> , Length, ApplicationInstance* |
| ApplicationId | → ID |
| ID | → UINT8 |
| ApplicationInstance | → InstanceID, Length, SortedAttributeList* |
| InstanceID | → UINT16 |
| SortedAttributeList | → ListHeader, ListBody |
| ListHeader | → <i>AttTypeId</i> , ListCount, <i>AttributeSize</i> , Checksum |
| AttTypeId | → ID |
| ListCount | → UINT8 |
| AttributeSize | → UINT8 |
| Checksum | → Fletcher-16 |
| ListBody | → Attribute* |
| Attribute | → Value, State |
| Value | → <i>Attribute value defined by Application</i> |
| State | → Declarator, Registrar |
| Declarator | → BIT |
| Registrar | → BIT |

Red: TBD(unsure)

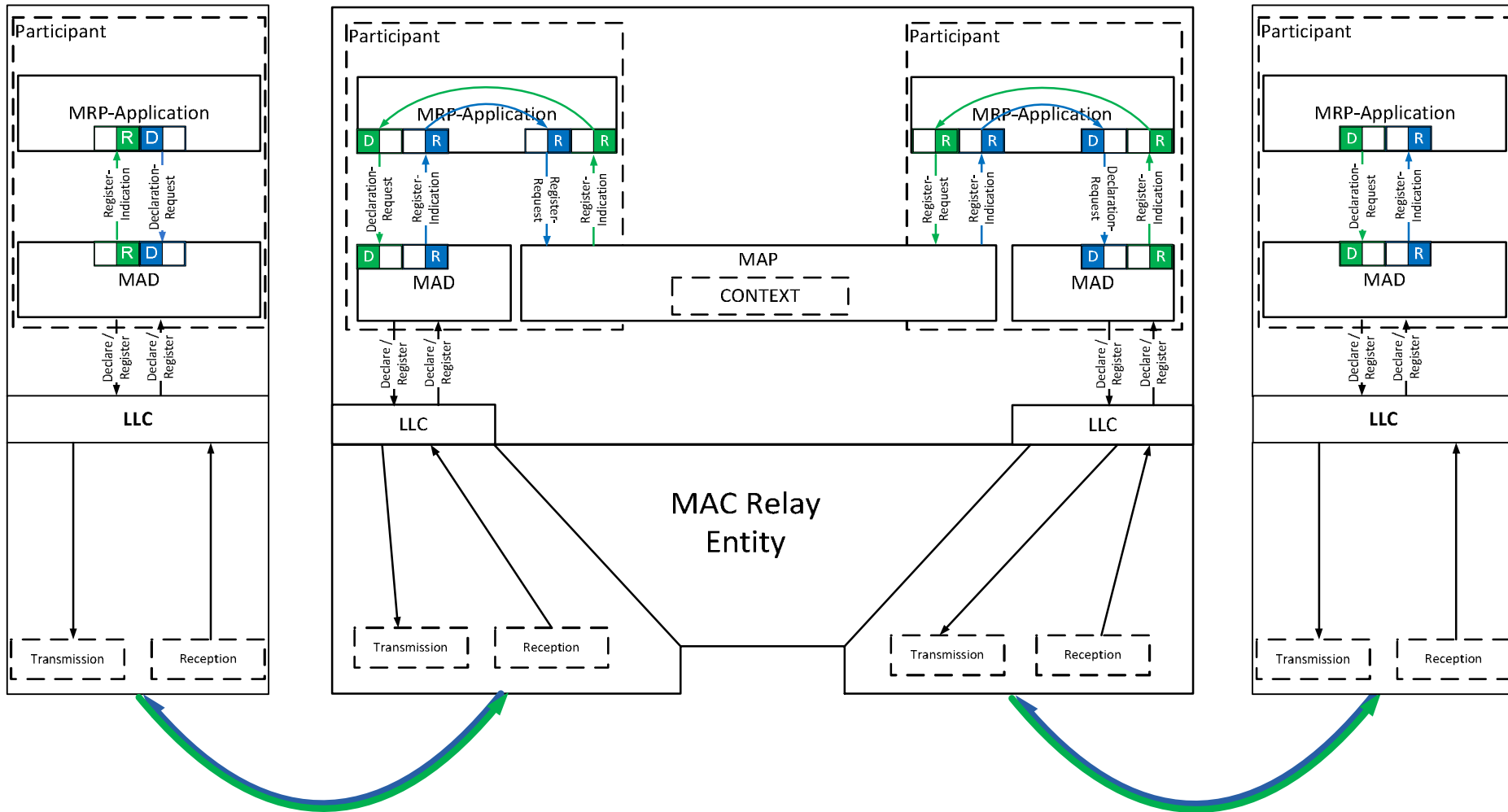
Green: Defined By Application

* := 0 - N

Fragment:



MRP++ Architecture



MRP++ States

| <u>State</u> | <u>R</u> | <u>D</u> | <u>Action</u> | <u>Description</u> |
|-------------------------------------|----------|----------|---------------|--------------------------------------|
| Empty | 0 | 0 | delete | No Attribute |
| Declared | 0 | 1 | --- | Declare / announce a "New Attribute" |
| Registered | 1 | 0 | | "New Attribute" registered |
| Established (Registered & Declared) | 1 | 1 | ready | "Attribute" registered and declared |

Thank you for your attention!



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