Centralized Admission Control Mechanism for SRP

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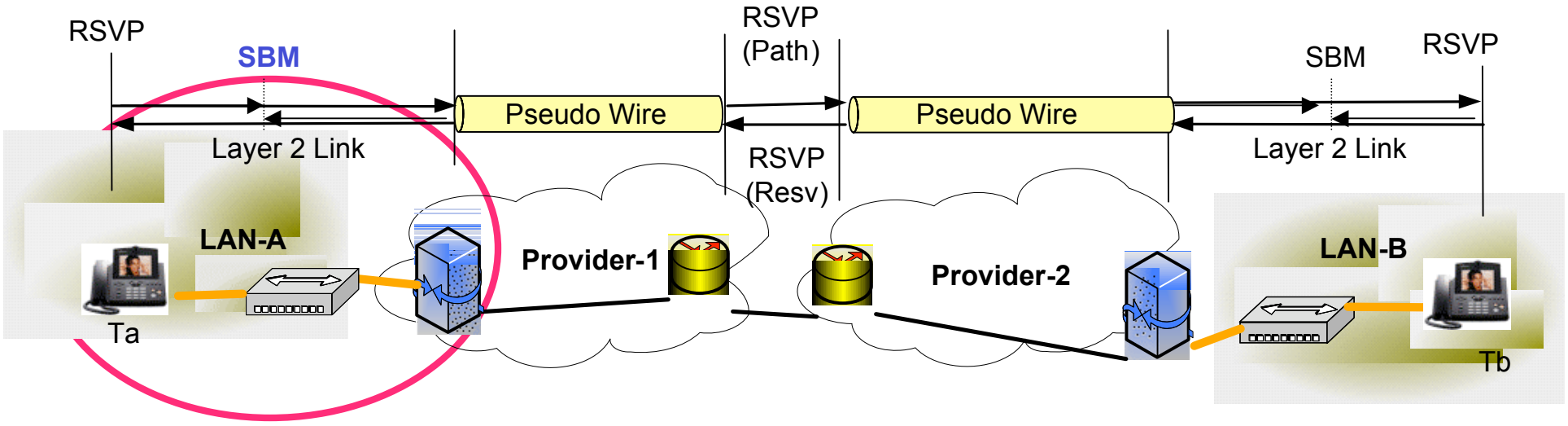
Jinseek Choi

jinseek@hanyang.ac.kr

Background -RSVP

- RSVP is a network control protocol that enables resource reservation and admission control working on layer 3, sits on the top of LAN.
- LANs would be treat as a transparent point-to-point link between two RSVP peers.
- So, the Subnet Bandwidth Manager(SBM) is a solution to handle QOS requirements over local area network. SBM is an RSVP-based protocol, which handles admission control and bandwidth reservation operations.

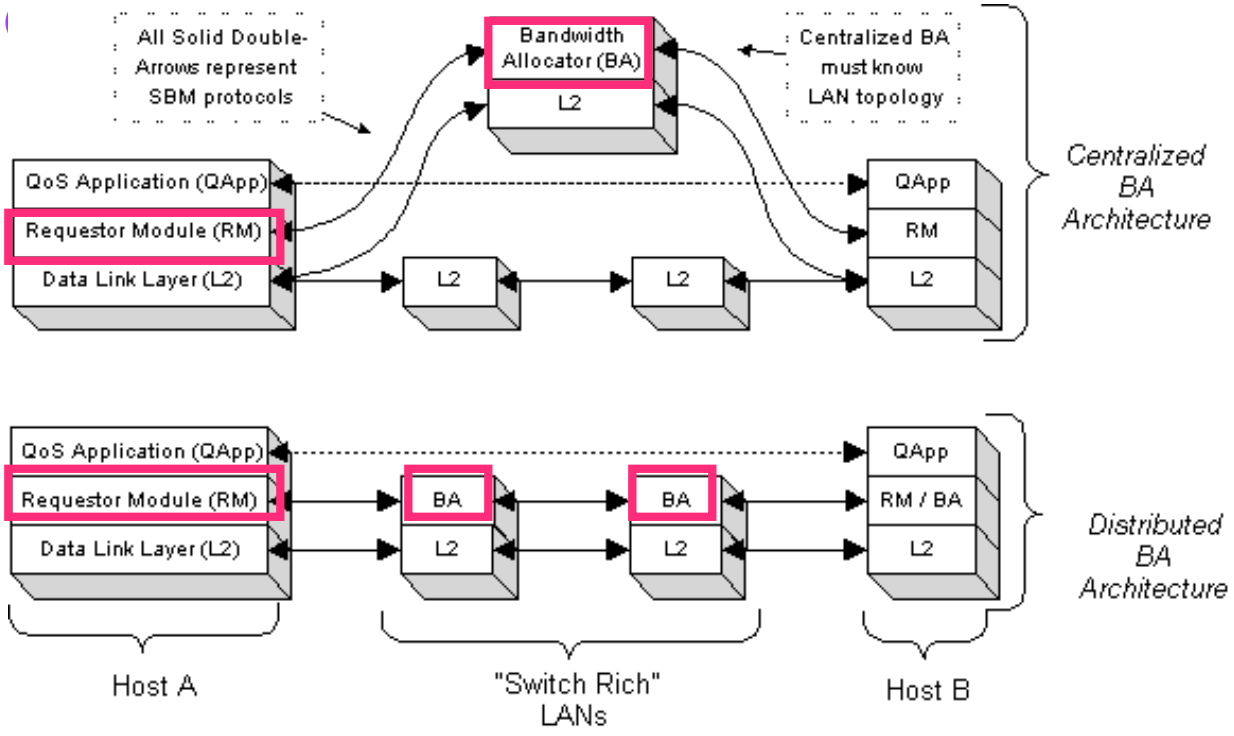


Background -SBM

- SBM is a signaling protocol for RSVP-based admission control over IEEE 802 LAN that allows communication and coordination between network nodes and switches and enables mapping to higher-layer QOS.
- The SBM should translate into link layer specification and convey RSVP messages between two RSVP peers
  - The logical components of the SBM are
    - Bandwidth allocator (BA)
    - Requestor Module (RM)
  - The SBM protocol provides an RM-to-BA or BA-to-BA signaling mechanism.
  - The SBM protocol is QOS protocol (such as RSVP) independent.
  - It provides an API interface rather than the protocol

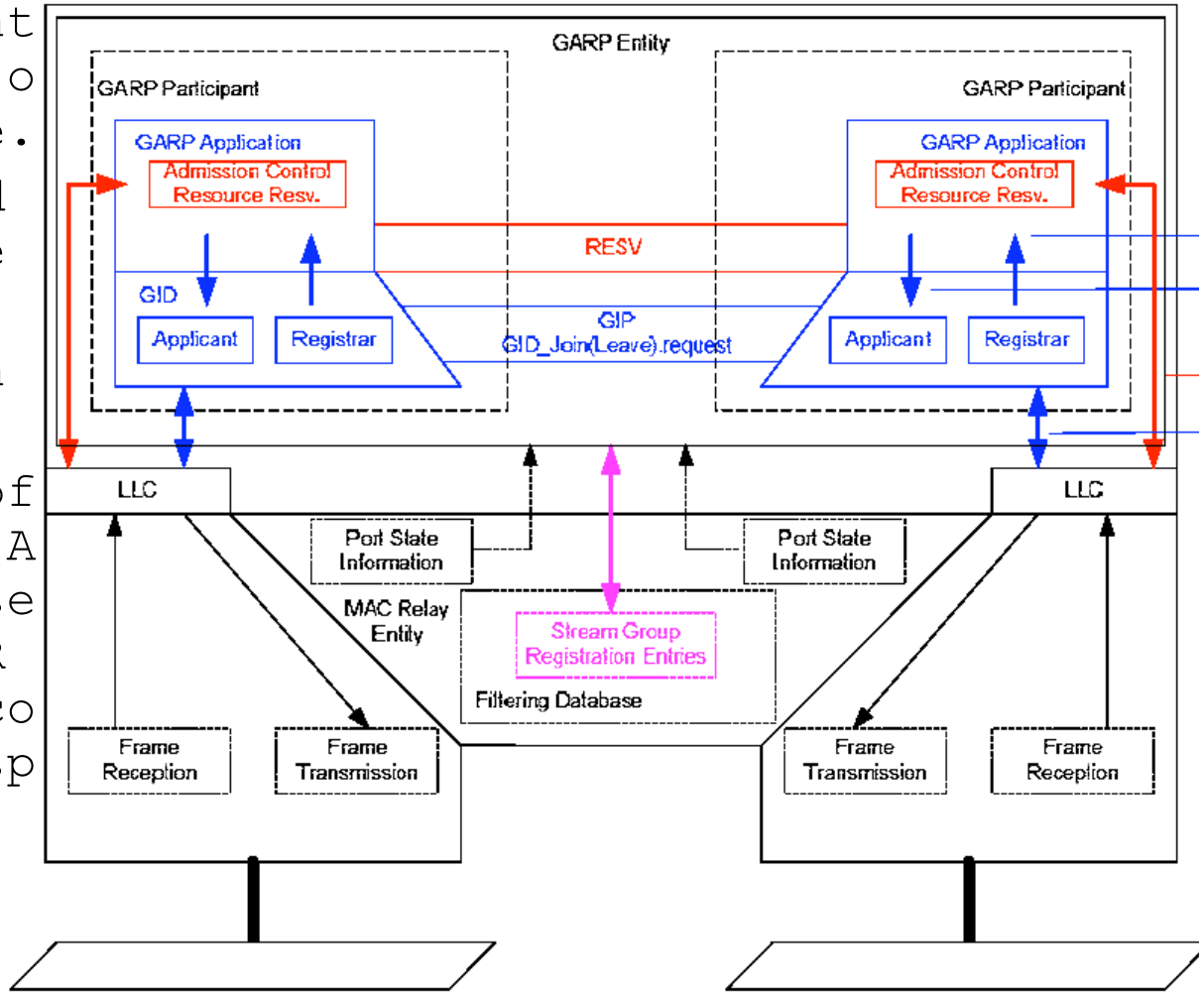
SBM: Centralized vs Distributed Admission control

- Admission Control
  - ✓ **The BW allocator (BA) processes RSVP PATH or RESV (establish PATH state in the switch, store the layer2/ 3 address, forward the PATH message to next hop)**
  - ✓ **Centralized BA** vs. Distributed BA



Background-SRP

- SRP is an application of Link layer control protocol based on GARP architecture.
- It is a distributed protocol compatible with IEEE 802.1.
- SRP is simpler than SBM.
- SRP has functions of admission control (AC) and resource reservation control (RRC), but admission control does not be specified in detail.



Requirement: SRP interaction

- SRP is a link layer admission and resource control protocol. It does not c are about the layer 3 reservation protocol.
- It is a stand alone admission and resource reservation protocol.
- However, SRP needs to communicate with other network layer QOS prot ocols(RSVP and SIP signaling protocol) with respect to admission contro l and resource reservation.

Shortcoming of Distributed Admission Control

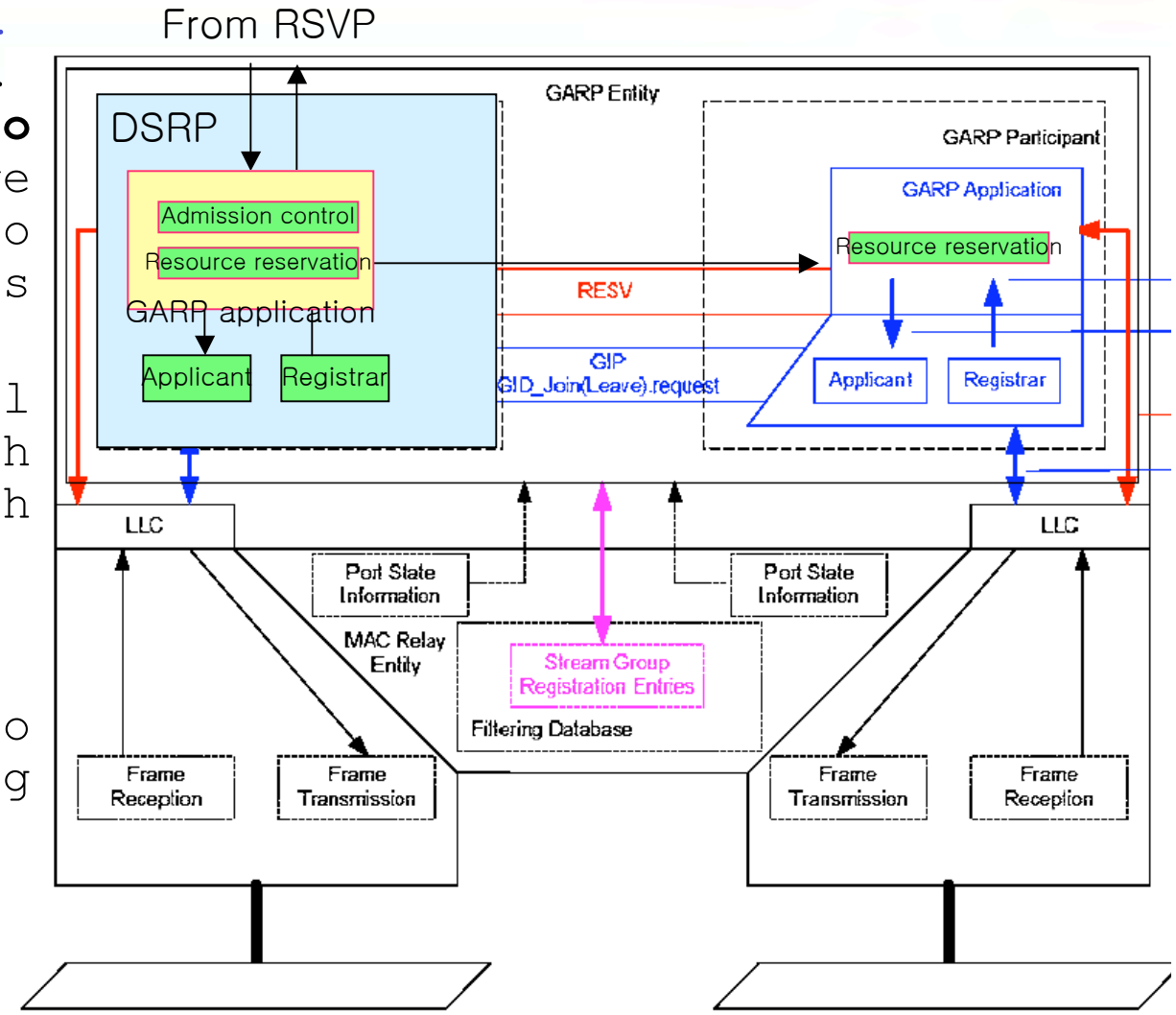
- Distributed admission controller has an advantage of the scalability, but it requires that all bridges and switches support admission control mechanism to compute topology as well as inventory.
- Each host and switch can manage the resource availability of each link.
- Every host and switch interact with existing resource management controls (such as SBM, RSVP, SIP based signaling protocol and so on).
- Comparing to centralized mechanism, distributed mechanism has the advantage of scalability but the distributed admission control algorithm has a problem of being not easier to deploy.

Why we need Centralized Admission Control in SRP

- Comparing to distributed admission controller, centralized admission controller has the advantage of being easier to deploy.
- Since LAN has the limits on the geographical size of the network, but the scalability is not a problem in AV networks.
- Centralized admission controller is easy to interact with existing resource management control protocols (such as SBM, RSVP, SIP and so on).
- SRP already has the knowledge of the layer 2 topology, e.g., link layer spanning tree information.
- Therefore, centralized admission controller would have to reserve resources on all segments for all flows which would lead to very efficient utilization of resources.

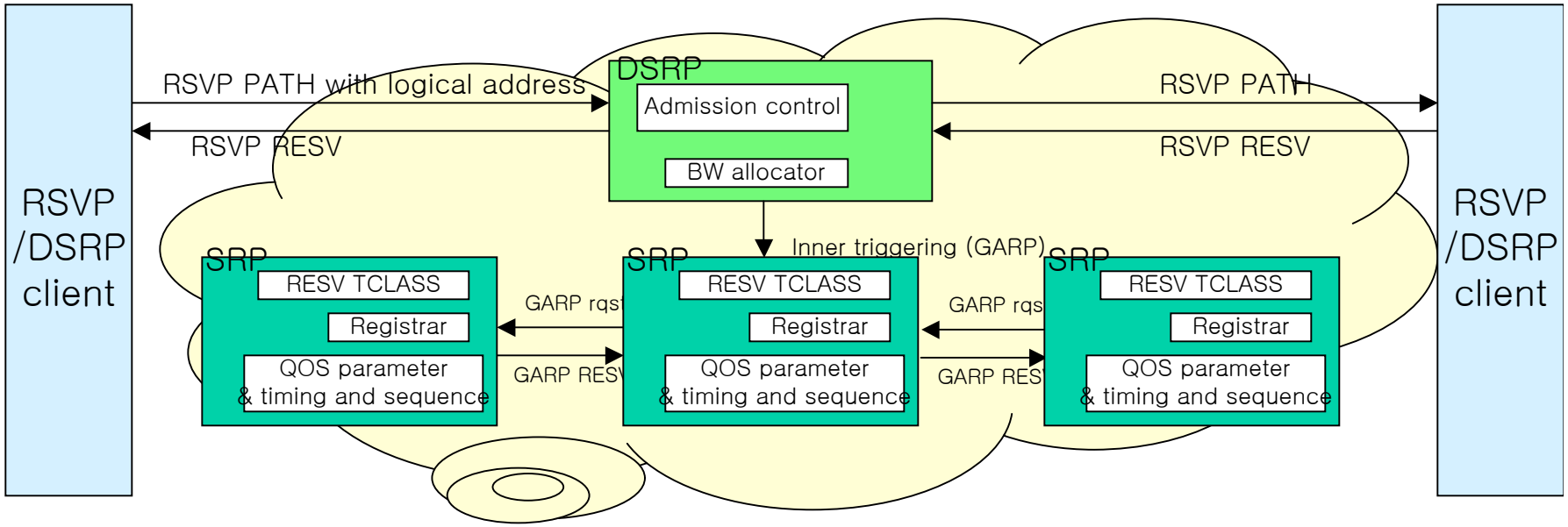
Proposal: Centralized Admission Control Mechanism

- **Designated SRP (DSRP)** is designed **as a centralized admission controller** (a layer 2 admission controller) similar to Designated SBM (DSBM).
- The DSRP may actually be co-located with a switch/bridge or host/router.
- Other Switch/Bridge do not take part in the admission control and resource management processes.



Proposal: Designated SRP interaction

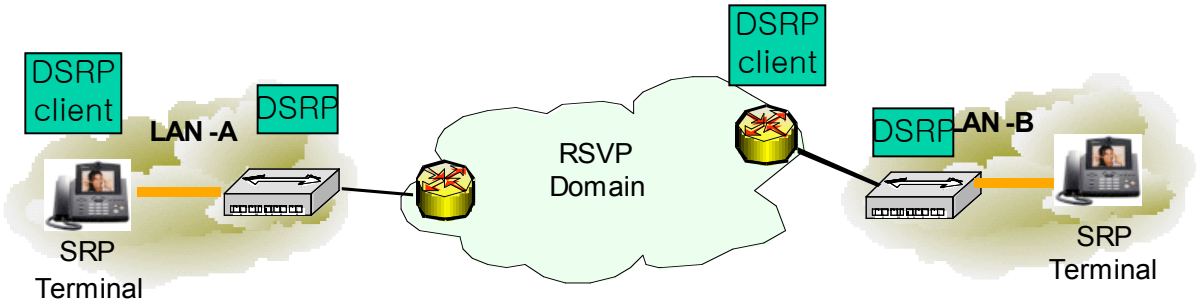
- DSRP can processes other QOS signaling functions such as SIP and RSVP PATH (establish PATH state in the switch, store the layer2/3 address, forward the PATH message to next hop)
- DSRP architecture is simpler than SRP architecture since Ingress host and egress router need not provide functions of SRP admission and reservation control.



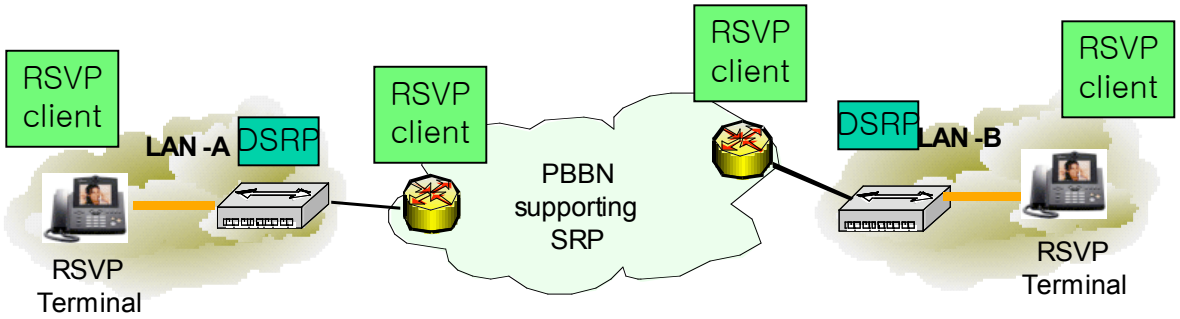
Functions of DSRP

- DSRP is responsible for the centralized admission decisions for the entire subnet.
- Intermediate bridges and switches need not have any function of the bandwidth management (BA) since they will not be actively participating in admission control.
- The end station requesting a reservation initiates communication with its DSRP.
- DSRP must have the knowledge of the layer 2 topology, e.g., link layer spanning tree information.
- Therefore, DSRP would have to reserve resources on all segments for all flows which would lead to very inefficient utilization of resources.

Two Interconnection Models



1. Two SRP segments are interconnected via RSVP domain



2. Two RSVP terminals are interconnected via SRP domain

Requirements for DSRP

DSRP admission control procedure handles traffic classes similar to DSBM, semantics of parameter, timing, type codes need to be congruent to the network layer traffic classes (RSVP, SIP)

e.g) **Message Mapping :**

RSVP-Path,Path-Tear → ? , ?

RSVP-Resv,Resv-Tear → DSRP Resv, DSRP Tear

RSVP-Error → DSRP Error (?)

QoS Parameters mapping: Token Bucket Size, Token Rate, Peak Rate, ..

% If it is different, edges may not perform admission control to backbone properly.

Timing & Sequence mapping : Path State Refreshment, Soft-state Cleanup, Error Recovery, etc..

Type Codes mapping : Error Codes, Policy Codes, Cryptographic Key..

Other Requirements

- DSRP should give sufficient information for resource control in IEEE 802 network.
- DSRP should minimize overhead for conversion between SRP←→RSVP/SIP
- DSRP should be able to carry Terminal type, Policy Data, User Authentication Info. for admission control, security check, charging, etc. … in provider network.
- DSRP need to have strong protection from DoS attack, refresh storm, and other user initiated security threats.

References

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