

# IETF BoF Session

Layer 2 Control

between Access Node and BNG

Version 1.0

# Layer 2 Control Mechanism

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# Layer 2 Control Mechanism

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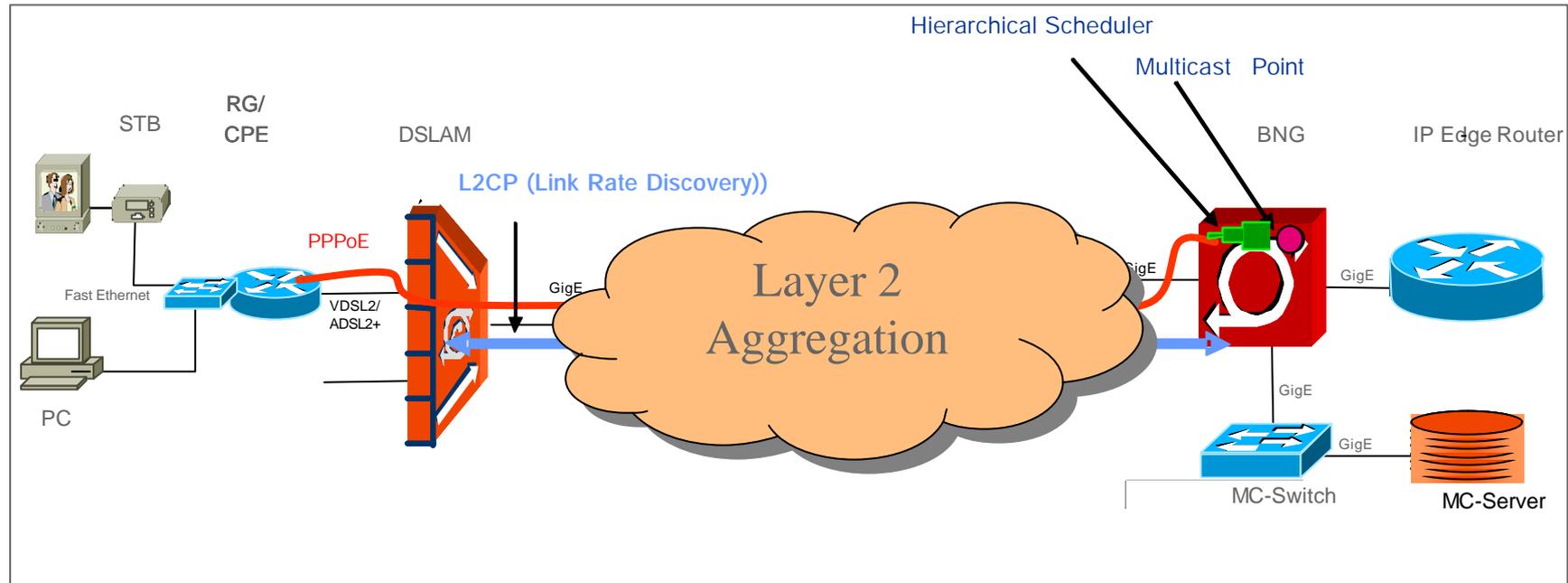
# Layer 2 Control Mechanism

## Problem Statement - Overall

Several sources like ITU-T H.610, DSLForum TR-059 describe the DSL architecture for delivery of voice, video and data services:

- The approaches require a static configured data link on layer 2
- The models define beside the data link the EMS architecture.
- Each network element is usually controlled by one element manager.
- The service node usually has no knowledge about actual DSL link characteristics - problem of "non synchronized" EMS
- Service oriented user entitlement control for Multicast unsolved
- End to End OAM in ATM/Ethernet based access networks unsolved

# Layer 2 Control Mechanism Reference Architecture



- PPPoE/IPoE session carries all traffic between BNG and DSLAM
- BNG is Multicast-Replication point.
- BNG receives information about DSL bit rate from the DSLAM via the principles of a Layer 2 Control Protocol.
- The BNG performs the QoS handling in downstream. QoS mapping works according hierarchical scheduling.

# Layer 2 Control Mechanism

## Problem Statement – Use Cases

### 1. Use Case Access Line Discovery (former Link Rate Discovery):

- Reporting the characteristics of the access links of an access device to a device that uses the information for e.g. queuing/scheduling purposes;
- Enforcement of service parameters on selected access links including physical layer (e.g. DSL sync. rate) or network layer service parameters (e.g. 802.1p scheduling configuration on the access link);

### 2. Use Case OAM

- Triggering a point-to-point OAM mechanism on selected access links.
- Mechanism include ATM OAM in case of ATM-Ethernet inter working and Ethernet OAM in case of E2E Ethernet network.

### 3. Use Case Multicast

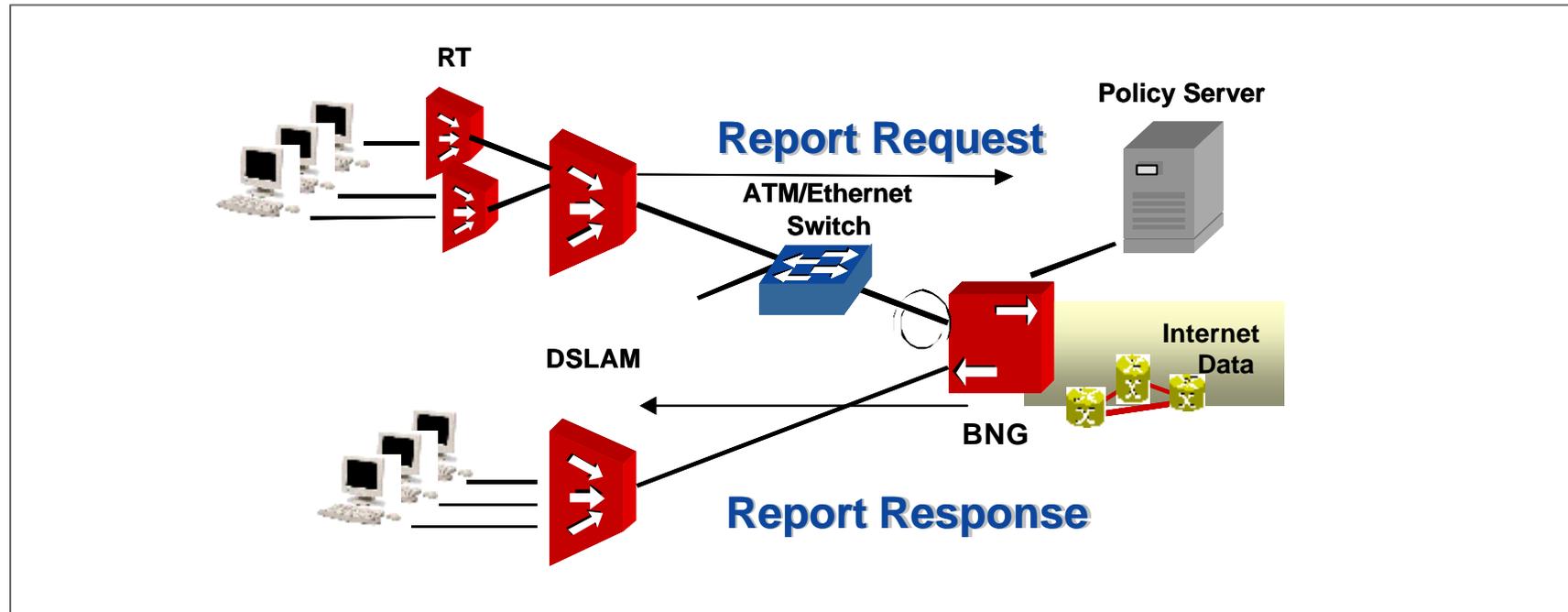
- Communicating multicast information between a subscriber management device and an access device in order to allow, for example, centralized policy control.

### 4. Use Case Line Configuration

- Triggered by subscriber request or Policy Server request the BNG may send line configuration information to the DSLAM.

# Layer 2 Control Mechanism

## Use Case 1: Access Line Discovery - Problem Statement



- Running Rate Adaptive Mode on DSL the data link between CPE and service node no bandwidth guarantee because of different shaper adjustment
- to prevent packet loss same shaper settings between DSL and service node needed
- alternative solution beside DHCP and PPPoE intermediate agent is not applicable because of having this information only if the customer is in session.

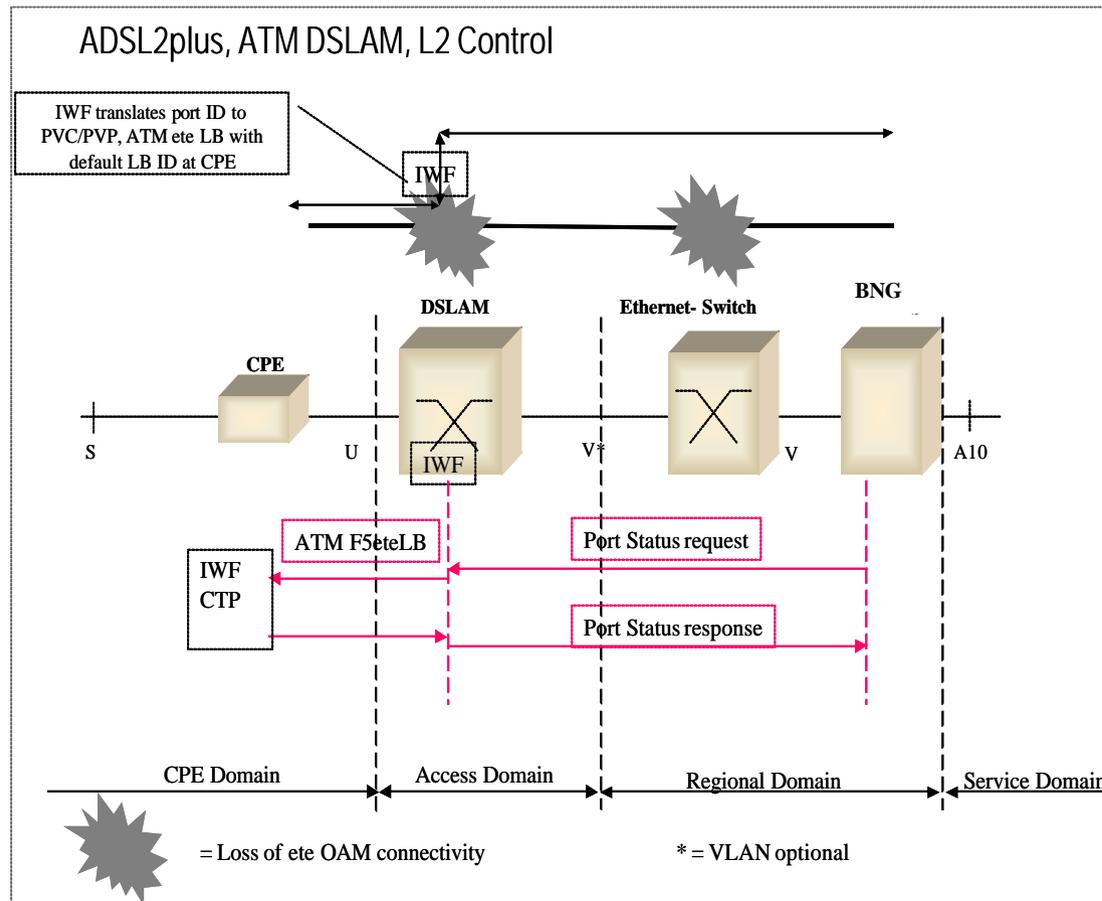
## Layer 2 Control Mechanism

### Use Case 1: Access Line Discovery – The Way out

- To close the gap of different non congruent bandwidth settings in the DSLAM and BNG the DSLAM must report to the service node to inform this element of the actual bandwidth to adapt it's shaper for downstream traffic to the actual DSL line rate.
- For transmitting the messages a layer 2 control communication channel between DSLAM and service node should be used

# Layer 2 Control Mechanism (Future Work)

## Use Case 2: OAM – Problem Statement ADSL2plus/ATM



- replacing ATM with Ethernet at the V-interface
- U-interface will keep ATM for the time being
- domain related management systems per access domain, regional domain and service domain - problem of "non synchronized" EMS
- Inter working between ATM and Ethernet to preserve existing operational functionality is essential
- End to end OAM visibility on L2 between BNG and CPE within layer 2 for addressing customer connection (default ID)

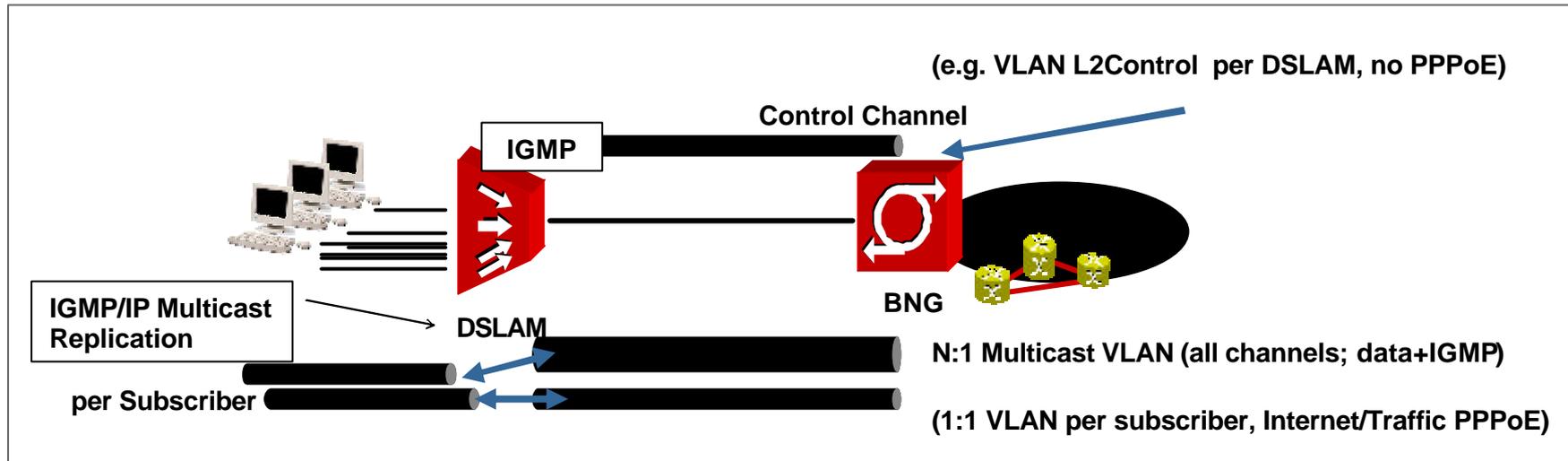
# Layer 2 Control Mechanism (Future Work)

## Use Case 2: OAM – The Way Out

- A solution for inter working between ATM based technologies at the U-interface and Ethernet based aggregation network needs to be worked out
- The solution must be applicable to ADSL2plus, and VDSL2
- BNG triggers DSLAM for OAM operation using Layer 2 Control Mechanism

# Layer 2 Control Mechanism (Future Work)

## Use Case 3: Multicast - Problem Statement



- Multicast services getting increasingly important
  - IPTV services, resource efficient, moving to Ethernet
- ATM architecture: **"transactional multicast"**
  - older DSL Forum work (PD-021)
  - avoid IGMP processing in access/aggregation nodes
- Ethernet architecture: **IGMP snooping / IGMP proxy**
  - Ethernet access/aggregation nodes control multicast content replication
  - draft-ietf-magma-snoop-12.txt, draft-ietf-magma-igmp-proxy-06.txt
  - DSL Forum TR-101

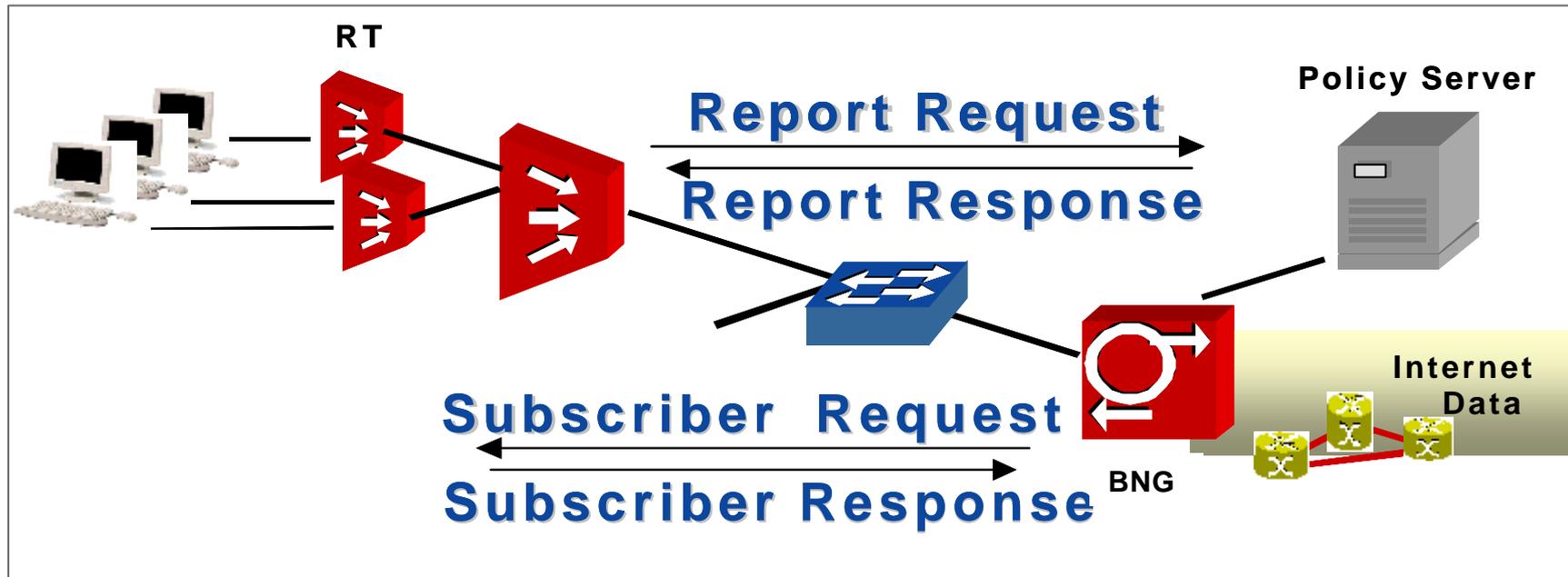
## Layer 2 Control Mechanism (Future Work)

### Use Case 3: Multicast – The Way Out

- For running multicast it may be useful to communicate multicast related information between BNG and an Access Node to allow e.g. centralized policy control
- Installing/removing per-user multicast access rights (“user entitlement”) on selected access ports on an Access Node
- Synchronization between the IGMP router in the BNG and the IGMP snooper/proxy in the Access Node (e.g. for accounting purposes)

## Layer 2 Control Mechanism (Future Work)

### Use Case 4: Line Configuration - Problem Statement



- The Access Node is not session and/or user aware
- Statically configured service/subscriber DSL parameter require reconfiguration by operator implying b2b transaction between ISP and Access Provider
- This system does not enable an automated operation/delivery process

## Layer 2 Control Mechanism (Future Work)

### Use Case 4: Line Configuration – The Way Out

- Triggered by subscriber request the BNG may send line configuration information to the DSLAM using Report messages.
- The BNG should get such line configuration data from a policy server (e.g. RADIUS).
- The BNG may update the line configuration due to a subscriber service level change (e.g. triggered by the policy server).

# Layer 2 Control Mechanism

## Best Practice - Plugfest & Interop Testing

### Target Plug fest November 2005 :

- multi-vendor inter-operable implementations of Use Case Access Line Discovery are based on "Layer2 control protocol extensions to GSMP" outlined in draft-wadhwa-gsmp-l2control-configuration-00.txt

### Upcoming Plugfest for Use Case OAM Line Configuration and Multicast:

- Verification of Use Case:
  - OAM
  - Multicast
  - Line Configuration
- Appreciate to continue future work based on frame work using an IETF standardized communication protocol

# Layer 2 Control Mechanism Protocol Requirements

