IETF 72 TANA BoF
Techniques for Advanced Networking Applications

ISP Requirements

Jason Livingood
and
Rich Woundy

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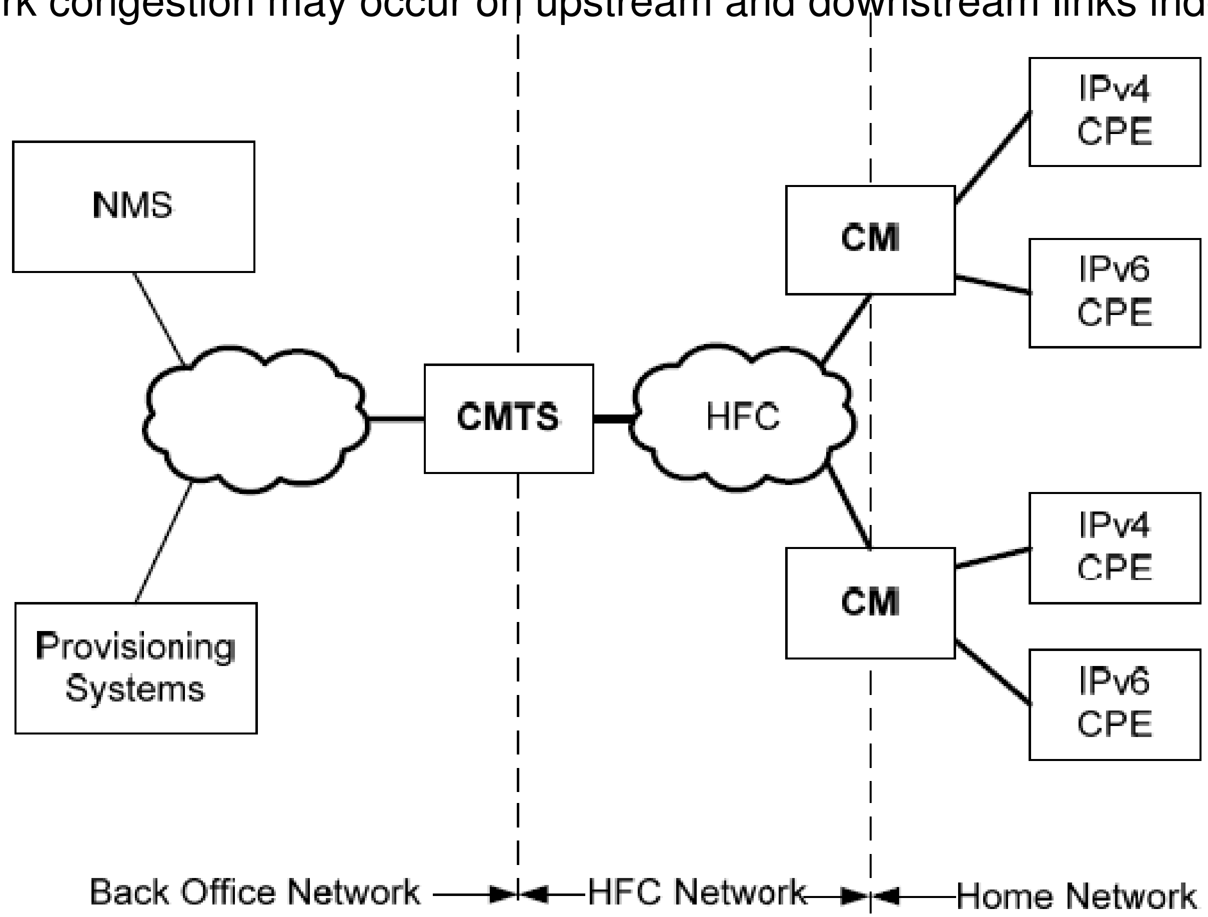
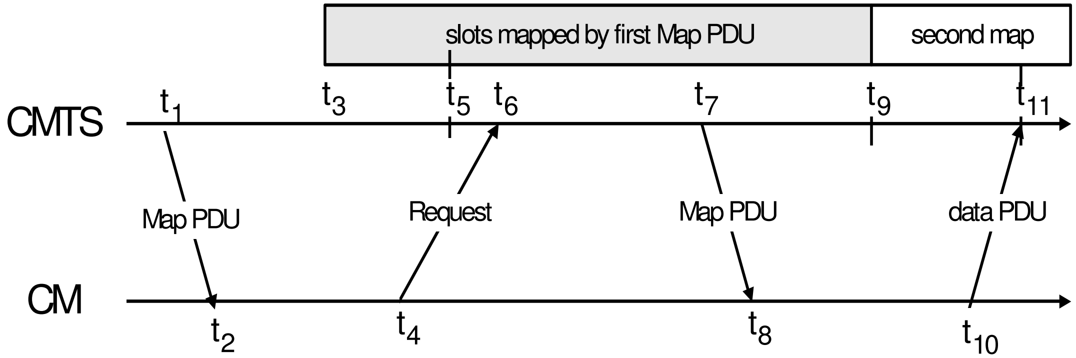
Overview of DOCSIS Network Architecture

- Focus is on the DOCSIS network, which is CMTS ←→ CM
  - A single CMTS node serves thousands of homes
  - A single CMTS node has multiple DOCSIS domains
  - Each DOCSIS domain could experience congestion independently of other domains
  - Network congestion may occur on upstream and downstream links independently.



Upstream Data Transmission and Congestion



Simplified upstream data transmission process:

1. CMTS transmits MAP PDU to downstream CMs (t1)
2. CM scans MAP for request opportunity (t2)
3. CM sends Request PDU to CMTS during request opportunity (t4)
4. CMTS transmits MAP PDU that includes data grant (t7)
5. CM transmits data PDU according to MAP data grant (t8, t10)
6. CM may 'piggyback' next request in data PDU (t10)

How congestion manifests itself in the DOCSIS network

- Like all networks, typically results from offered instantaneous load exceeding available capacity
- If many CMs attempt to send simultaneous upstream requests, there may be collisions which result in upstream transmission delays

Note: how "TCP flow fairness" applies to the DOCSIS upstream is an open research question

Selected TANA Requirements from an ISP's Perspective

- Must work end-to-end with today's technology & networks
  - Not some to-be-built future network – this is an immediate-term problem
- Would like to leverage a low priority data class
  - Low priority data class defined in RFC 4594
    - Similar to Internet2 QBone Scavenger Service (QBSS)
  - Need to be able to articulate & demonstrate the benefit for subscribers
    - ***Cannot be a "slow lane" in perception or fact***
- Would like to have common priority classes generally agreed to and standardized for various types of applications
  - To guide users, application developers, and ISPs in designating or implementing appropriate classes
- Would like to enable users, applications and/or devices to express traffic priority preferences to the network
  - E.g. leverage DiffServ for expressing user traffic priorities
- Would like to communicate congestion conditions back to devices/applications
  - E.g. leverage ECN for informing about congestion conditions

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Concerns Related to TANA Requirements

- Lack of ECN support in home routers
  - MSFT issues with popular home gateway devices when it encountered ECT(0) and ECT(1) – see tsvarea slides from March 2007 *<http://www.ietf.org/proceedings/07mar/slides/tsvarea-3/sld6.htm>*
  - Home routers are typically owned by customers, not ISPs
- Lack of existing inter-ISP DiffServ support
  - Signaling “upstream” traffic priority is easier than “downstream” priority
  - Passing DiffServ across ISP boundaries is problematic
  - Customers may have widely varying views of what applications are important to them, so need flexibility
- Help standardize ALTO/P4P methods to enable ISPs to share network topology information, network preferences and other information, with P2P and other apps
  - Improve & accelerate the application experience via methods which may include greater flow localization and smart peer selection, while also benefiting ISP network utilization, and by extension benefiting users