RTP Subsessions

draft-ejzak-avtcore-rtp-subsessions

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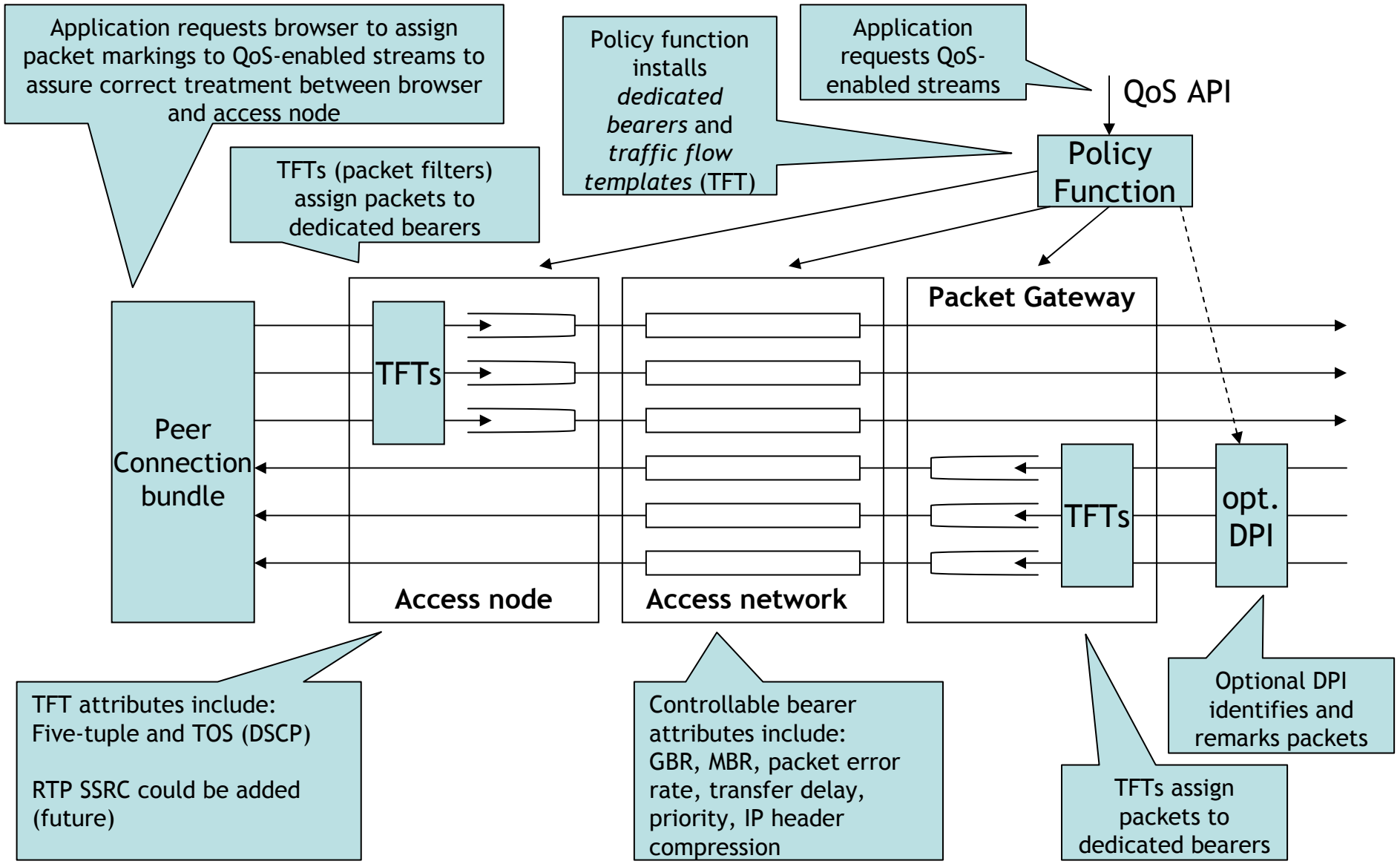
Problem statement

- How can we provide differential QoS treatment to media streams of different media types that are multiplexed (using BUNDLE) on the same five-tuple?
- Why? To be able to provide differential treatment without losing the advantages of bundling (significant reduction of ICE and DTLS signaling).

Assumptions

- Focus on QoS in access network
  - Access network the most critical portion of end-to-end path for many use cases
    - E.g., wireless
- Consistent with marking-based QoS
- No dependence on markings received from network
- Application is able to request access network QoS
- Application is able to select markings assigned to media streams if necessary to ensure that –
- Packets with different markings are handled by independent queues on path between browser and access node (e.g., wireless device or modem)
  - Assumption consistent with architecture of many mobile devices (e.g., smartphones)
  - Problematic in many existing home networks but this is a problem that needs to be solved anyway

Simplified LTE QoS example



Remaining issues

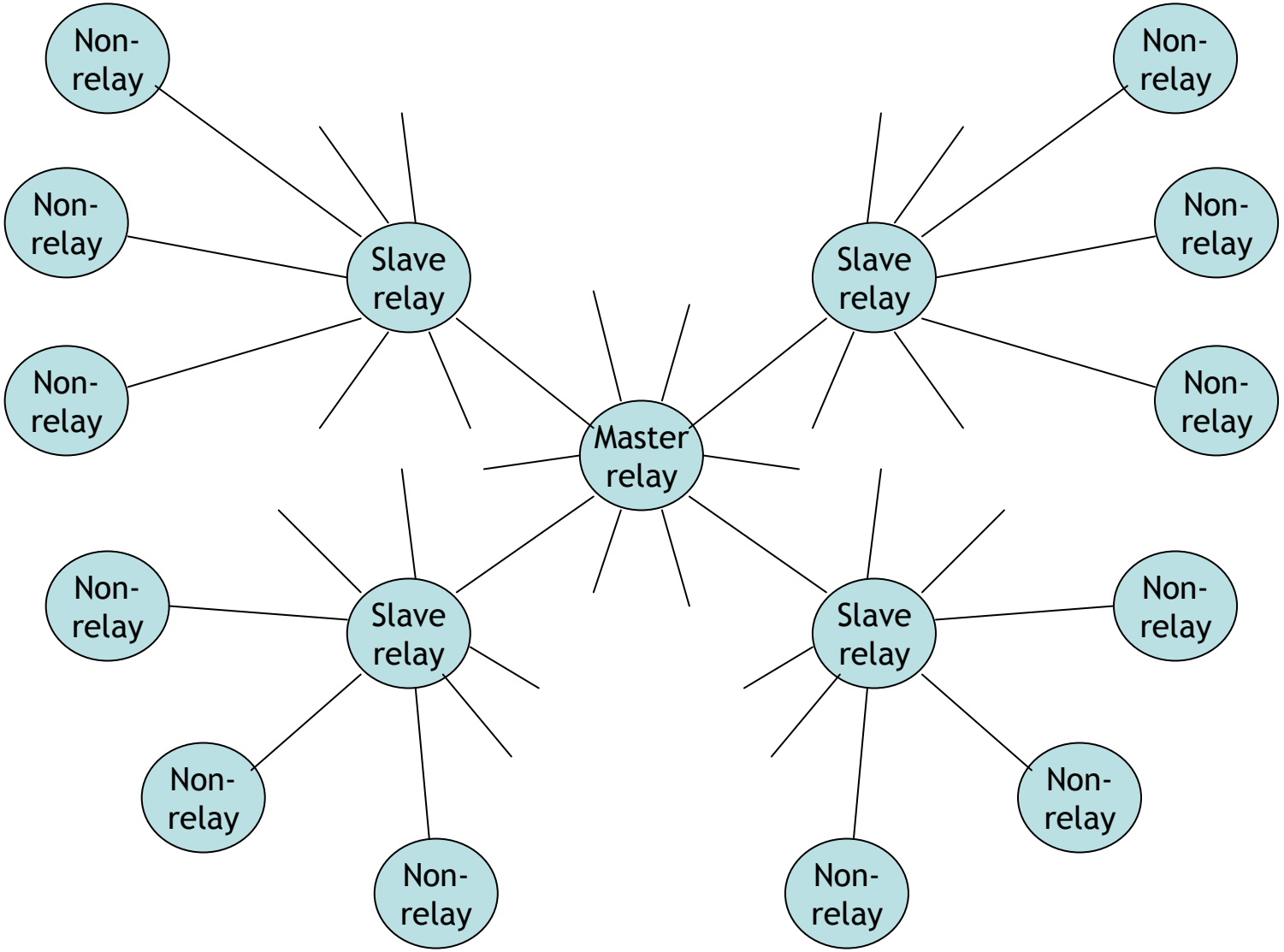
- Network policy requires the network to identify packet flows to determine packet markings and dedicated bearer assignments
  - i.e., don't trust application or network markings
- ➢ Since BUNDLE multiplexes different flows onto a single five-tuple, the network must use RTP information to accomplish this

- A bundled RTP session may concatenate RTCP packets for RTP streams with different QoS, making it likely that RTCP information for an RTP stream will be assigned different QoS
- ➢ Need a way to assure that an RTCP packet receives QoS as good or better than the corresponding RTP

Proposed solution

- RTP subsessions:
  - Each bundled m-line is allocated an RTP subsession
  - Pre-allocate range of SSRC values for use by each RTP subsession endpoint
  - Use SDP attribute to specify SSRC prefix per m-line
  - 128 subsessions can share the same 5-tuple
  - Network uses SSRC prefix in TFT to identify packets for QoS treatment
  - No change to RTP or RTCP message formats
  - Reuse RTP session procedures on each RTP subsession
    - In particular, only RTCP packets from a single RTP subsession are concatenated
  - SSRC reservation avoids collisions
    - More consistent with features that need to identify the contents of individual RTP streams by reserving SSRCs (proposed in both rtcweb and clue)
  - Fully consistent with non-relay topologies (independent SSRC assignment per link in end systems and RTP mixers)
  - Relay (translator) topologies supported between all systems supporting RTP subsessions
    - Legacy interworking provided via SSRC mapping (RTP mixer)

Use in RTP subsession relay topologies



SSRC bit assignments

Bit 1:	identifies direction of flow
Bits 2-8:	subsession id (for QoS)
Bits 9-16:	allocated by primary relay to slave relays (except one value reserved for self)
Bits 17-24:	allocated by slave relays to non-relay systems
Bits 25-32:	allocated by non-relay systems to individual RTP streams

SDP attribute examples

a=ssrc-prefix non-relay 0x111111

a=ssrc-prefix relay 0x222222

- Media level attribute
- “non-relay” or “relay” and whether attribute is in an SDP offer or answer together indicate role in negotiation and identify use of SSRC prefix bits
- “master relay” always initiates SDP offer (so distinction between master and slave is implicit)
- Hex value in attribute specifies first 24 bits of SSRC
- SDP offer/answer negotiation details in draft

Summary

- RTP subsessions provides an effective solution to:
  - Allow an access network, under request from an application and consistent with network policy, to identify bundled media flows for differential treatment, assign them to appropriate bearers, and remark them
  - Ensure that RTCP packets get the same treatment as the corresponding RTP streams
  - Consistent with new applications that use SSRC values to identify individual streams (i.e., rtcweb and clue)
  - Consistent with non-relay and new relay topologies
  - Reuse RTP/RTCP formats and procedures (modified)

Comparison to SHIM

- RTP subsessions and SHIM address different problems with bundling

SHIM	RTP subsessions
Preserves independent RTP session and SSRC space per m-line	Partitions single RTP sessions between m-lines by allocating SSRC ranges
Poor support for differential treatment of bundled RTP sessions (SHIM header at end of packet)	Good support for differential treatment of RTP subsessions based on SSRC prefix filtering
Changes RTP/RTCP message formats	No changes to RTP/RTCP message formats

Next steps?