

DCPEL Proposal

Kathleen Nichols
nichols@pollere.com

(with contributions from Olivier Dugeon and Paulo Mendes)

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What problem(s) are we solving?

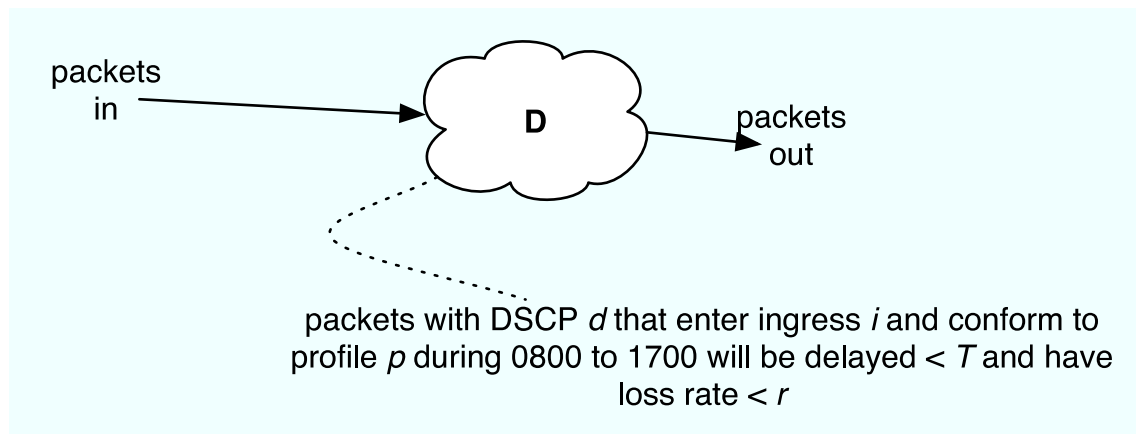
- It's about "DifS" not QoS. Operators might want to differentiate traffic for a wide range of reasons including QoS differences
- About how to operationally ensure that the differentiated services an operator intends are enabled. Make use of diffserv forwarding path elements to implement the network operator's objectives as represented in policy rules.
- Not about signaling or configuration protocols per se. Expect to use existing standards and/or contribute in those WGs if necessary
- A flexible and open framework for a diffserv control plane on a domain. Could be a common view that is independent of the underlying technology.

Differentiated Services

- Are enabled by applying rules at network domain edges to create traffic aggregates distinguished by particular DSCPs which are coupled to specific forwarding path treatments within the domain
- Node level mechanisms were defined in RFC 2474 and 2475. These include classifiers to select packets for traffic aggregates, policers and shapers to condition the traffic aggregate, and the per-hop behaviors implemented by queueing and scheduling.
- Per-Domain Behaviors were defined in RFC 3086 to define how to use those forwarding path components to compose traffic aggregates that receive particular treatments across the domains that can be characterized by metrics. (BE in 3086 and LE in RFC3662 only IETF-defined ones.)
- It was noted in RFC3086 that PDBs are “where the forwarding path and the control plane interact”. It’s time to specify how that interaction can occur.

DiffServ Control Plane (DCP)

From policy rules and (optionally) dynamic requests, use the DiffServ forwarding path mechanisms of the domain to ensure traffic streams are treated as expressed in the rules



Outcome: **for** a traffic stream within particular rate bounds and temporal characteristics and (optionally) on the correct interface and with the correct markings, **get** certain service characteristics (loss rate, delay bound, etc) across the network domain.

A goal of dcpel is to express a framework that makes this happen.

DCP at 1,000 feet (305 m)

- Outside of a DCP, physical and business (or other policy) constraints determine **what** you can offer (e.g. how much of which PDBs and PDB attributes)
- At any point in time, DCP is used to configure the network edge to deliver this “what” to specific traffic streams
- Network state should be monitored with such information available for use by the DCP in making decisions about allocation of differentiated services
- Dynamic changes (from hourly config updates to sub-second signaling, etc.) can be implemented by changing the configuration of edge nodes (in particular classifiers and policers) in response to requests (through signals, messages, operator commands, etc).

Common Elements

Network domains are built with varying technologies and goals. A diffserv control plane framework needs to be general enough to encompass all these but specific enough to be useful.

Loosely analogous to diffserv's "toolbox" approach in the forwarding path, can specify elements of a diffserv control plane by their functionality and interfaces. Not all elements will be present in all networks.

Elements include (see draft):

1. allocation engine
2. request manager
3. network state manager
4. policy repository
5. authentication
6. router agent (RFC 3290)

Intra-domain DCP Framework

Specify the functional elements and their interfaces.

Use existing standards and practice where possible. (NETCONF, COPS/RAP, NSIS?)

Some elements may be null for some networks.

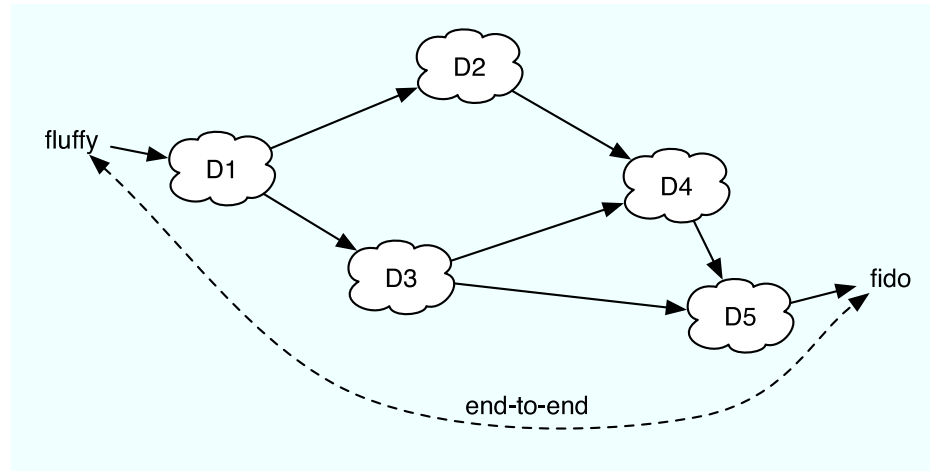
Security must be part of the framework.

Framework should encompass a range of specific solutions that are tailored to constraints of particular networks and should be open.

Framework should be flexible in location of functional elements in network and methods of their coordination.

Test and develop framework against worked examples and perhaps frameworks of other bodies like MultiService Forum.

Inter-domain Considerations



- Ensure that packets from fluffy to fido take a path for which metrics can be provided for packet treatment.
- If first have a model for the intra-domain diffserv control plane and that model comprises request handling, should be able to look at inter-domain considerations later.
- The ability of each domain to provide and enforce metrics is first step.
- Explore interworking with SIP (RFC 3312), ARSVP, NSIS. What exists and what is missing.

Issues that should not be ignored

Delivery of particular PHBs and PDBs over different technologies.

Host or networks may be mobile.

Services must cover traditional data, not just real-time services

Traffic streams may include multicast

Differentiated services vulnerable to DOS attacks?