Protocol for Forwarding Policy Configuration (FPC) in DMM

draft-ietf-dmm-fpc-cpdp-10

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IETF 101, London

2018-03-18

Agenda

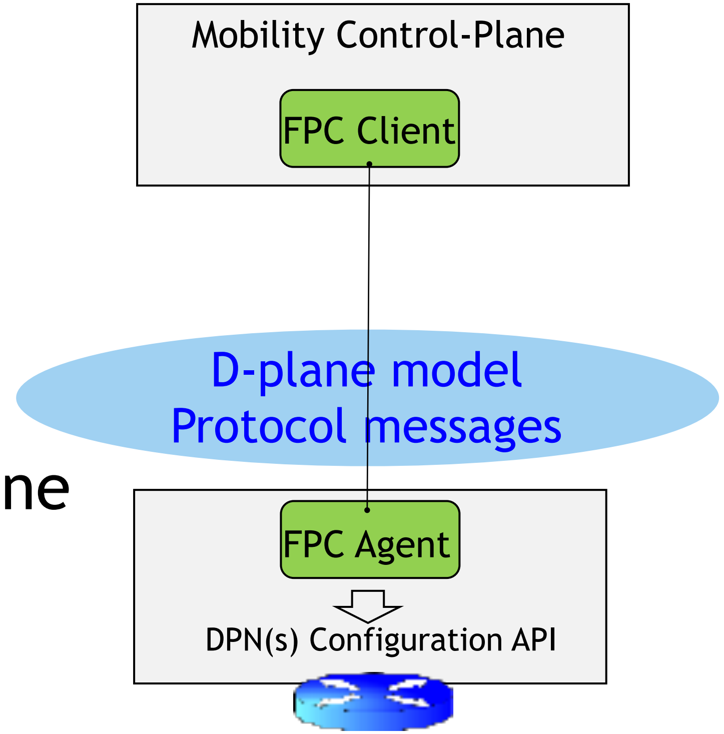
- Updates Since Version 09
    - Templates
    - Policy
    - Topology & Service
    - Mobility Context
    - RPCs
- Next Steps

What is this work about..?

- Enable the separation of a mobility network‘s Control-Plane function from its Data-Plane function

- Enable distributed deployment of Control- and Data-Plane functions by abstracted Data-plane model and protocol messages

- Support multi-tenancy on a single real deployed D-plane network and multiple domains within a tenant



Changes since Version 09

Migration to a Template based framework. This affects all elements. The framework has a template definition language.

Topology

DPN Peer Groups and DPN Groups are now PeerServiceGroup and ServiceGroup.

The Topology system supports selection information by ServiceGroup or ServiceEndpoint.

Policy

Rule was inside Policy and now is Rule-Template and stands as a peer structure to Policy.

Types, e.g. Descriptor Types, Action Types, etc., are now templates that have no values filled in.

Mobility Aspects

The embedded rule from version 09 has been replaced by a template that has no predefined variables. All rules, pre-configured or embedded, are realized as Policy instantiations.

Mobility Context is migrated to a Template Design.

The Unassigned DPN is used to track requests vs. those that are installed, i.e. Agent assignment of Policy is supported.

Operation(s)

Bulk Configuration and Configuration now follow a style similar to YANG Patch. Agents MAY response back with edits it made to complete the Client edit request.

All operations have a common error format.

Misc

Basename is split into two aspects. The first is version which applies to Templates. The second is checkpointing which applies to specific sections only.

RFC 5777 Classifiers have been added.

Templates

Simplify development and maintenance of the needed policies and other objects

```
 +-[Template] <U-Key, Name> (M) <Set>
|      +-[Attributes] <Set> (M)
|      +-[Extensible ~ FALSE]
|      +-[Entity-State ~ Initial]
|      +-[Version]
```

Definition Notation

'[Att-Name:]' Mandatory Attribute is defined, but template does not provide any configured value.

'[Att-Name: Att-Value]' Mandatory Attribute is defined, and has a statically configured value.

'[Att-Name: ~ Att-Value]' Mandatory Attribute is defined, and has a default value.

'[Att-Name]' Non-mandatory Attribute may be included but template does not provide any configured value.

'[Att-Name = Att-Value]' Non-mandatory Attribute may be included and has a statically configured value.

'[Att-Name ~ Att-Value]' Non-mandatory Attribute may be included and has a default value.

Configuring Policy Templates

A Policy Template may be configured in several stages by configuring default or missing values for Attributes that do not already have statically configured values.

Entity Configuration Blocks:

- Domain-Policy-Configuration
- DPN-Policy-Configuration
- Descriptor-Configuration
- Action-Configuration
- MN-Policy-Configuration
- Flow-Policy-Configuration

Pattern

```
[Entity Configuration Block]
|       +-[Entity-Key] (M)
|       +-[Attribute-Expression] <Set> (M)
```

DPN Example

```
|
+-[DPN] <G-Key>, <Name> (O) <Set>
|     +-[Extensible: FALSE]
|     +-[Interface] <L-Key> <Set>
|     |      +-[Role] <U-Key>
|     |      +-[Protocol] <Set>
|     |      +-[Settings] (O)
|     +-[Domain-Key]
|     +-[Service-Group-Key] <Set> (O)
|     +-[DPN-Policy-Configuration] <List> (M)
|     +-[DPN-Resource-Mapping-Reference] (O)
```

Policy

```
|
+-[Policy Information Model]
|      +-[Extensible:]
|      +-[Policy-Template] <G-Key> (M) <Set>
|      |       +-[Policy-Status]
|      |       +-[Rule-Template-Key] <List> (M)
|      |       |       +-[Precedence] (M)
|      +-[Rule-Template] <L-Key> (M) <Set>
|      |       +-[Descriptor-Match-Type] (M)
|      |       +-[Descriptor-Configuration] <Set> (M)
|      |       |       +-[Direction] (O)
|      |       +-[Action-Configuration] <Set> (M)
|      |       |       +-[Action-Order] (M)
|      +-[Descriptor-Template] <L-Key> (M) <Set>
|      |       +-[Descriptor-Type] (O)
|      |       +-[Attribute-Expression] <Set> (M)
|      +-[Action-Template] <L-Key> (M) <Set>
|              +-[Action-Type] (O)
|      |       +-[Attribute-Expression] <Set> (M)
```

Rule was inside Policy and now is Rule-Template and stands as a peer structure to Policy.

Types, e.g. Descriptor Types, Action Types, etc., are now templates that have no values filled in.

Policy Lifecycle

```
|
+-[Policy Information Model]
…
```

Design - Entity Status = Initial, ParticallyConfgured or Configured

```
|
+-[DPN] <G-Key>, <Name> (O) <Set>
…
|     +-[DPN-Policy-Configuration] <List> (M)
…
```

DPN Policy Installation & Customization
Entity Status = Initial, ParticallyConfgured or Configured

```
+-[Mobility-Context] <G-Key> <Set>
…
      |            +-[DPN-Key] <Set>
      |            |       +-[Role]
      |            |       +-[DPN-Policy-Configuration] <Set>
..
      |            |       |       +-[Service-Group-Key]
      |            |       |       +-[Interface-Key] <Set>
      |            |       |       +-[Flow-Policy-Configuration] <Set>
…
```

Mobility Sessions Entity Status = Initial, ParticallyConfgured, Configured or Active

Topology & Service

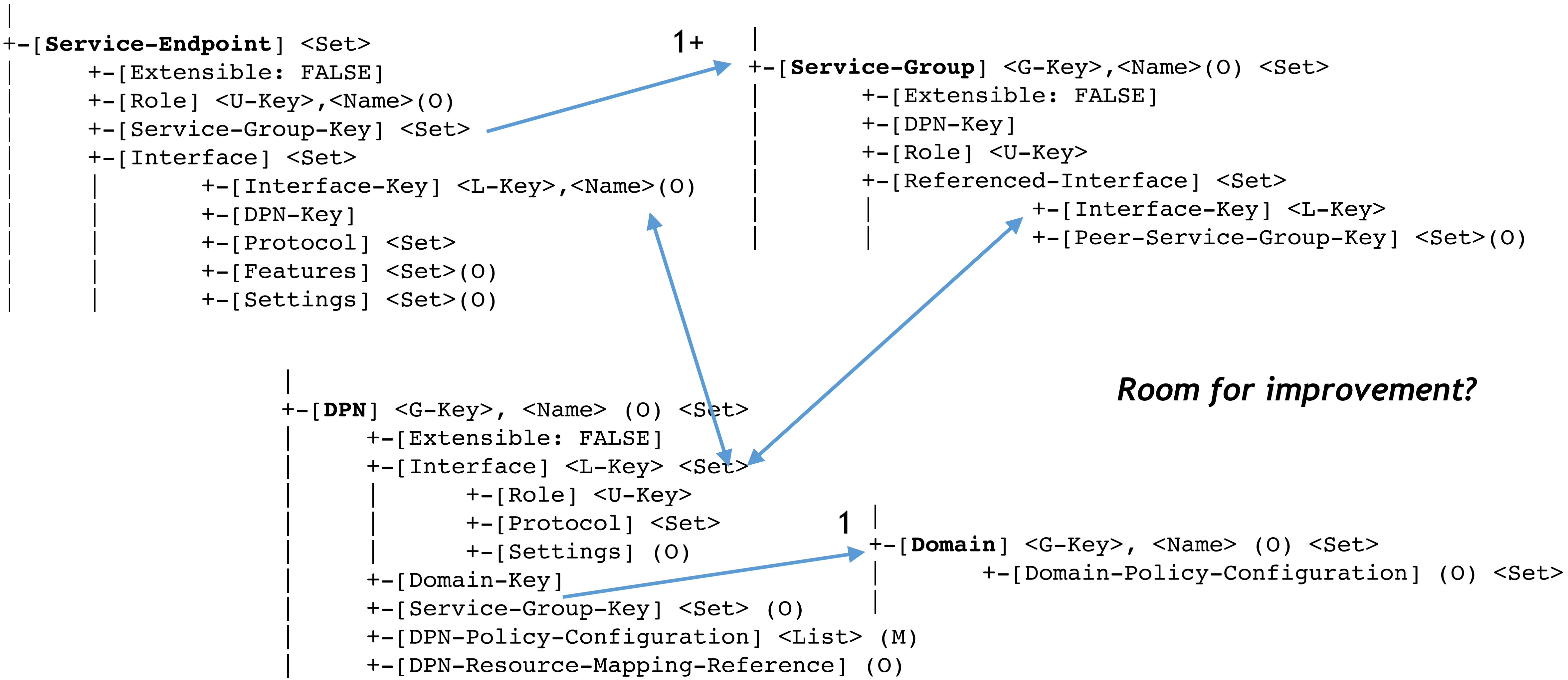
```
DPN Groups => ServiceGroup
  Definition: A collection of DPN interfaces
  serving some data-plane purpose.

DPN Peer Groups => PeerServiceGroup

ServiceEndpoint
  Definition: is the collection of all services
  provided by DPN interfaces in the network.

Domain
  Definition: represents a group of
  heterogeneous Topology resources typically
  sharing a common administrative authority.

DPN

Access-Technology is gone as it is assumed in
Role (which is now a U-Key)
```

```
|
+-[DPN] <G-Key>, <Name> (O) <Set>
|     +-[Extensible: FALSE]
|     +-[Interface] <L-Key> <Set>
|     |      +-[Role] <U-Key>
|     |      +-[Protocol] <Set>
|     |      +-[Settings] (O)
|     +-[Domain-Key]
|     +-[Service-Group-Key] <Set> (O)
|     +-[DPN-Policy-Configuration] <List> (M)
|     +-[DPN-Resource-Mapping-Reference] (O)
```

DPN NOW holds Policy

Installed-Policy Concepts from v09 are gone

Topology & Service - Relationships



```
|
+-[Service-Endpoint] <Set>
|     +-[Extensible: FALSE]
|     +-[Role] <U-Key>,<Name>(O)
|     +-[Service-Group-Key] <Set>
|     +-[Interface] <Set>
|     |       +-[Interface-Key] <L-Key>,<Name>(O)
|     |       +-[DPN-Key]
|     |       +-[Protocol] <Set>
|     |       +-[Features] <Set>(O)
|     |       +-[Settings] <Set>(O)
```

```
|
+-[Service-Group] <G-Key>,<Name>(O) <Set>
|       +-[Extensible: FALSE]
|       +-[DPN-Key]
|       +-[Role] <U-Key>
|       +-[Referenced-Interface] <Set>
|       |           +-[Interface-Key] <L-Key>
|       |           +-[Peer-Service-Group-Key] <Set>(O)
```

```
|
+-[DPN] <G-Key>, <Name> (O) <Set>
|     +-[Extensible: FALSE]
|     +-[Interface] <L-Key> <Set>
|     |      +-[Role] <U-Key>
|     |      +-[Protocol] <Set>
|     |      +-[Settings] (O)
|     +-[Domain-Key]
|     +-[Service-Group-Key] <Set> (O)
|     +-[DPN-Policy-Configuration] <List> (M)
|     +-[DPN-Resource-Mapping-Reference] (O)
```

```
|
+-[Domain] <G-Key>, <Name> (O) <Set>
|       +-[Domain-Policy-Configuration] (O) <Set>
|
```

Room for improvement?

Mobility Context

```
+-[Mobility-Context] <G-Key> <Set>
|            +-[Extensible ~ FALSE]
|            +-[Delegating-IP-Prefix:] <Set>
|            +-[Parent-Context]
|            +-[Child-Context] <Set>
|            +-[Mobile-Node]
|            |       +-[IP-Address] <Set>
|            |       +-[MN-Policy-Configuration] <Set>
|            +-[Domain-Key]
|            |       +-[Domain-Policy-Configuration] <Set>
|            +-[DPN-Key] <Set>
|            |       +-[Role]
|            |       +-[DPN-Policy-Configuration] <Set>
|            |       +-[ServiceDataFlow]
|            |       |       +-[Service-Group-Key]
|            |       |       +-[Interface-Key] <Set>
|            |       |       +-[Flow-Policy-Configuration] <Set>
|            |       |       |       +-[Direction]
```

The embedded rule from version 09 has been replaced by a template that has no predefined variables. All rules, pre-configured or embedded, are realized as Policy instantiations.

Mobility Context is migrated to a Template Design.

The “Unassigned” DPN (reserved Key) is used to track requests vs. those that are installed, i.e. Agent assignment of Policy is supported.

RPCs

- Migrated to YANG-Patch Style (not quite compliant)
    - Eliminated CONF_BUNDLES as a result
    - Update now has more options including move, merge, etc.
- Also migrated ALL error responses to a common format (based also on YANG Patch)

```
rpcs:
+---x configure
|  +---w input
|  |  +---w client-id          fpc:client-identifier
|  |  +---w execution-delay?   uint32
|  |  +---w yang-patch
|  |     +---w patch-id    string
|  |     +---w comment?    string
|  |     +---w edit* [edit-id]
|  |        +---w edit-id         string
|  |        +---w operation       enumeration
|  |        +---w target          target-resource-offset
|  |        +---w point?          target-resource-offset
|  |        +---w where?          enumeration
|  |        +---w value?          <anydata>
|  |        +---w op-ref-scope?   fpc:ref-scope
|  |        +---w instructions
|  |           +---w (instr-type)?
|  |              +--:(instr-3gpp-mob)
|  |              |  +---w instr-3gpp-mob?
                                fpcbase:threegpp-instr
|  |              +--:(instr-pmip)
|  |                 +---w instr-pmip?       pmip-commandset
```

Configure Output

- Unlike YANG-Patch we also permit updates (subsequent-edits) to complete an edit.
  - This is the equivalent of Agent changes in responses used in v09

```
|  +--ro output
|     +--ro yang-patch-status
|        +--ro patch-id       string
|        +--ro (global-status)?
|        |  +--:(global-errors)
|        |  |  +--ro errors
|        |  |     +--ro error*
…
|        |  +--:(ok)
|        |     +--ro ok?            empty
|        +--ro edit-status
|           +--ro edit* [edit-id]
|              +--ro edit-id            string
|              +--ro (edit-status-choice)?
|                 +--:(ok)
|                 |  +--ro ok?                empty
|                 |  +--ro notify-follows?   boolean
|                 |  +--ro subsequent-edit* [edit-id]
|                 |     +--ro edit-id      string
|                 |     +--ro operation    enumeration
|                 |     +--ro target ypatch:target-resource-offset
|                 |     +--ro point? ypatch:target-resource-offset
|                 |     +--ro where?       enumeration
|                 |     +--ro value?       <anydata>
|                 +--:(errors)
|                    +--ro errors
|                       +--ro error*
|                          +--ro error-type enumeration
|                          …
```

Next Steps

- This week
  - Improve or eliminate ServiceEndpoints
  - Add 1 more example to doc for topology selection
- Feedback - Tell us what is not intuitive!
- Edits, edits, edits
- More Examples
  - How many more to add (maybe a separate work)
- Reviews