

PCEP extensions for the computation of route offers with price

draft-carrozzo-pce-pcep-route-price-00

G. Carrozzo, G. Bernini, G. Landi

{g.carrozzo, g.bernini, g.landi}@nextworks.it

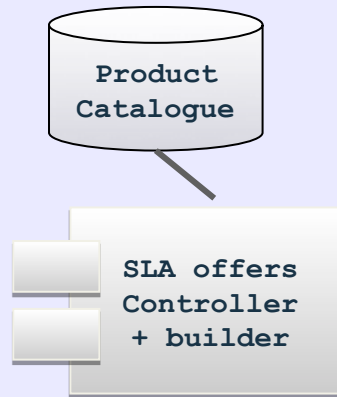
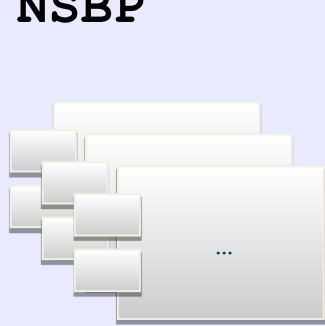
Nextworks

Network Service & Business Plane

- NSBP includes all the functions for
 1. service specification and offer creation
 2. product offers publication
 3. e2e offer composition
 4. triggering service provisioning
(→ std PCE cycle + LSP setup)
 5. manage service operation/monitoring
(→ OAM)
 6. triggering service deletion
(→ LSP tear-down)

Service PCE & NSBP

NSBP



PCEP

Service PCE

PCEP

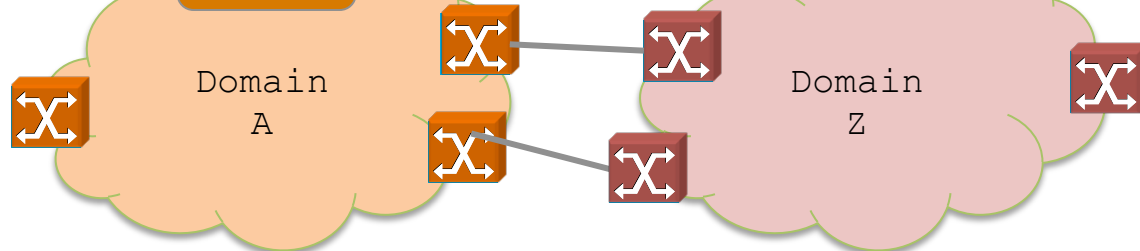
PCEP

Child-PCE

Domain A

Child-PCE

Domain Z



- route offers can be in the form of sparse multi-domain EROs + cost + price
- route prices computed according to
 - constraints specified by PCC:
 - end points
 - bw
 - other metrics
 - load balancing
 - ...
 - PCE policies (ref. RFC5394)

Route price vs. route cost

Route cost(s)/metric(s) := Traffic Engineering indicators used by the **network administrator** (carrier) to optimize the usage of its **network resources**

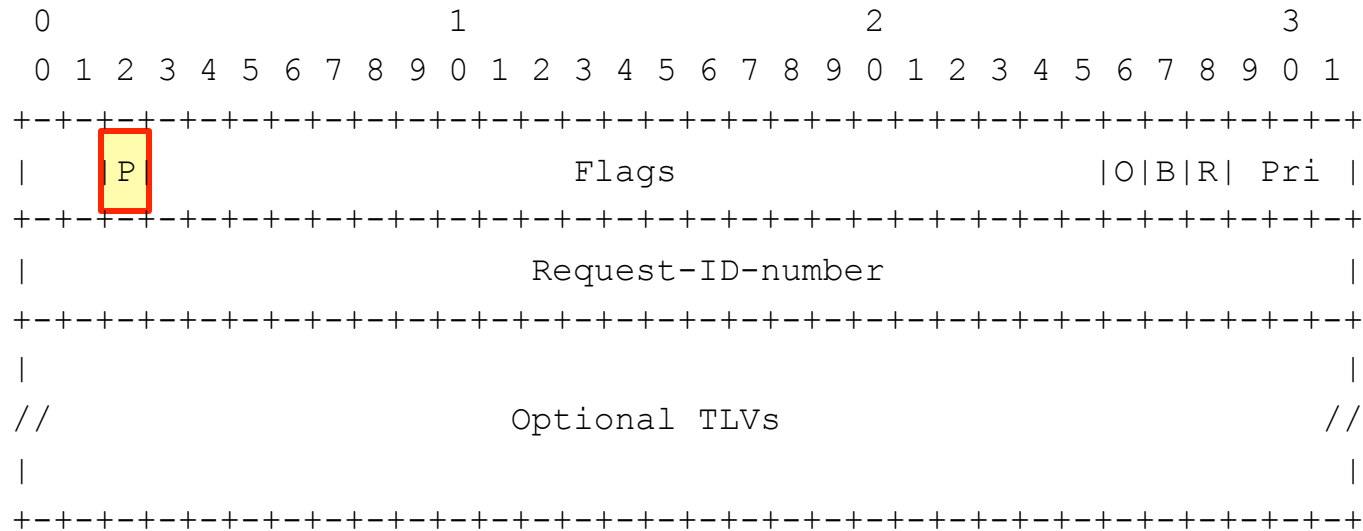
- 1 IGP metric[[RFC5440](#)]
- 2 TE metric[[RFC5440](#)]
- 3 Hop Counts[[RFC5440](#)]
- 4 Aggregate bandwidth consumption[[RFC5541](#)]
- 5 Load of the most loaded link[[RFC5541](#)]
- 6 Cumulative IGP cost[[RFC5541](#)]
- 7 Cumulative TE cost[[RFC5541](#)]
- 8 P2MP IGP metric[[RFC6006](#)]
- 9 P2MP TE metric[[RFC6006](#)]
- 10 P2MP hop count metric[[RFC6006](#)]
- ...

Route price := EUR/\$\$

refers to the **customer-supplier interaction** at the business level for offering, negotiating and, eventually, instantiating a network connectivity \ service (e.g. a [G]MPLS LSP)

- depends on strategic factors
- depends on the ingress/egress interfaces/PoPs
- influenced by the amount of mobilized network resources (route)

PCEP RP Object extension



- 1 bit in RP object (**Price Request bit**)
 - PCC to set P-bit in case of route offer computation
 - When P-bit is set, the PCE computes a set of route offers
- A PCErr message with Error-Type "Capability not supported" sent back to PCC if PCE does not support it

PRICE-INFO Object

```
<PCRep Message> ::= <Common Header>
                    <response-list>

<response-list> ::= <response> [<response-list>]

<response> ::= <RP>
               [<NO-PATH>]
               [<attribute-list>]
               [<path-list>]

<path-list> ::= <path> [<path-list>]

<path> ::= <ERO> <attribute-list>

<attribute-list> ::= [<price-info-list>]
                    [<LSPA>]
                    [<BANDWIDTH>]
                    [<metric-list>]
                    [<IRO>]

<metric-list> ::= <METRIC> [<metric-list>]

<price-info-list> ::= <PRICE-INFO> [price-info-list]
```

- For successful route offers computation
 - at least 1 PRICE-INFO object per PCRep msg (if P-bit is set in RP)
 - multiple PRICE-INFO objects when more than one route offer is identified by the PCE for the same service
 - All the PRICE-INFO objects carried in a path refer to the same ERO computed by the PCE
- In case of unsuccessful route offers computation
 - NO-PATH object is included as for standard path computation procedure

Next steps

- Continue collecting feedbacks
 - this meeting, the mailing list, etc.
 - some just received via email
- Refine the document
 - PRICE_INFO field as TLV?
 - min bits allocated with current format
 - More overhead with TLVs, but a more flexible / extensible object (e.g. express more caps)
 - Discuss any framework convergence with
 - pce-hierarchy-fwk
 - Service-awareness metrics work (delay, jitter, etc.)
 - Stateful PCE
- Find consensus towards progressing to WG I-D