Preferred Path Routing (PPR) Updates

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IGP Core drafts & Recap

- What is this ? A new path routing (control plane) mechanism builds on respective IGP SPT
- Concept First presented at IETF101
- After renaming, taking significant feedback, IGP drafts presented at IETF102
- Details:
  - IS-IS Extensions draft-chunduri-lsr-isis-preferred-path-routing-01
  - OSPF Extensions draft-chunduri-lsr-ospf-preferred-path-routing-01
  - Covers core protocol extensions with PPR-ID, Preferred PDE Sub-TLVs and attributes
  - Includes both I/O, SPF changes needed and Forwarding entry installation (for various data planes)
  - Includes transparent OAM/Path traffic accounting attributes
- LSR/ Combined Yang model draft
  - draft-qct-lsr-ppr-yang-00

Why do we need these (recap)

- To reduce path overhead in the data plane or on the packet, thus
  - Liberating from underlying hardware capabilities on how many SR SIDs/Labels can be on the packet
    - MSD fix only helps to mitigate, if there is an alternate path, which meets the operator requirements
  - For achieving Line Rate capabilities regardless of the SID depth needed
  - To avoid MTU/Fragmentation issues with large SID stacks
  - To reduce Header Tax as NW/Path overhead relative to actual application data, especially for small payload packets (mIOT and uRLLC in 5G or in various fixed scenarios).
- For simplified path traffic accounting/transparent OAM
- For extensible data planes
- For other path attributes and improved fast-reroute alternatives

Backward Compatibility

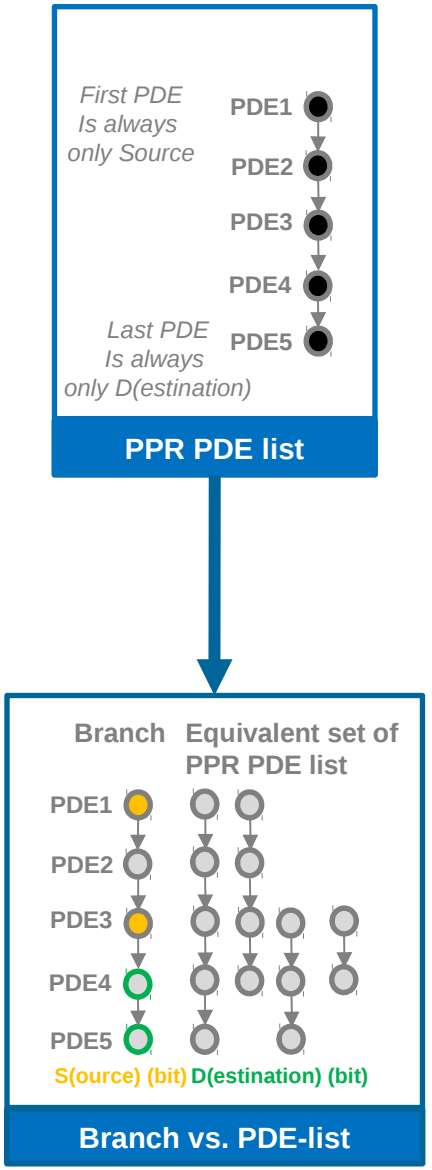
- It’s a complimentary control plane work to SR
- Fully backward compatible with SR data planes (SR-MPLS, SRH/SRv6)
- PPR capability for SR data planes is optional;
  can be used to reduce the packet overheads & for simplified traffic accounting

Scalability

- **There would millions of flows in the network ≠ not millions of paths!**
  [for O(N^2) question, N being number of ‘nodes+links’]
- PPR scale is simply a function of number of routes a network can support
- An optional TREE structure can be helpful in some environments, which brings some optimizations ⊥ details are in **draft-ce-ppr-graph-00**
- Each PPR Tree uses one label/SID and defines paths from any set of nodes to one destination, thus reduces the number of entries needed from SRGB at each node (more details in the draft).

PPR Graphs

- A (non-enhanced) PDE list) indicates a path from exactly one source PDE (first PDE in list) to exactly one destination PDE (last PDE in list).
- We introduce for each PDE two additional bits: the S(ource) and D(destination) bits.
- Each PDE can have the source and/or the destination bit or neither. If it has neither, it is called a “transit PDE”.
- We call PDE lists enhanced in this way “Branches” because these can be used further to construct PDE Graphs from them.
- So the source/receiver bits allow the compression of multiple PDE-lists into one Branch (as shown aside)
- A PPR Graph is a Graph consisting (like any Graph) of edges/nodes and vertices. Each node is a PDE, vertices are by default unidirectional an example of a Graph is a Tree.
- More details in the draft [draft-ce-ppr-graph-00]



ETSI WGs & Use Cases

ETSI NGP WG's various use cases and how it fits in there is covered in

- ETSI WI#14 – http://docbox.etsi.org/ISG/NGP/70-Draft/0014/NGP-0014v001.docx
- Work item is sponsored by Vodafone, BT, BSI and Huawei

5G Use Case & DMM WG Relation

#1 – 5G Backhaul and PPR

draft-clt-dmm-tn-aware-mobility-02

draft-cls-ppr-te-attributes-00

- Proposes how transport network aware mobility can be achieved for various 5G scenarios, including signaling.
- This proposal doesn't remove GTP layer and works with any chosen option for new 5G N9 interface

- Please note: The above is orthogonal to SRv6, which also supports GTP layer removal for 5G

#2 – GTP Replacement including new user plane for N9 Interface

- DMM WG is responding to 3GPP Study item for optimized 5G user plane
  - 3GPP Study Item **http://www.3gpp.org/ftp/tsg_ct/WG4_protocollars_ex-CN4/TSGCT4_82_Gothenburg/Docs/C4-181380.zip**
  - 3GPP Scenarios, Requirements, Solution Comparison **https://www.ietf.org/id/draft-bogineni-dmm-optimized-mobile-user-plane-01.txt** (SRv6, LISP, ILA and many more potential alternatives)
  - PPR helps most of the proposals to reduce the transport overhead on 5G N3/N9 interfaces

Status & Next Steps

- Seek more comments/suggestions/feedback
- more questions ? uma.chunduri@gmail.com

Thank you!