Path Computation Element (PCE) Discovery using Domain Name System (DNS)

draft-wu-pce-dns-pce-discovery-03

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Recap.

- The existing IGP based PCE discovery mechanism doesn’t work in
  - Inter-AS Path Computation
    - PCE in each AS participant in different IGP
  - Hierarchy of PCE
    - parent PCEs and child PCEs are not a part of the same routing domain.
  - Northbound distribution using BGP
    - A external PCE doesn’t participant in the same IGP
  - NMS/OSS
    - PCC is NMS/OSS that doesn’t participant in IGP
    - PCE is part of NMS/OSS that doesn’t support IGP and gain topology info from other means.

- Benefit of using DNS based PCE discovery
  - Inherent load sharing
  - Avoid generating unwanted traffic due to IGP flooding
  - Flexible for transport protocol selection
DNS Based PCE Discovery

1. PCCs (or other PCEs) first decide in which realm to look for a PCE (search path)
   - Search path can be preconfigured or discovered using Diameter, DHCP etc.
2. PCCs (or other PCEs) then decide which application id they are interested in and which transport protocol they use.
3. PCCs (or other PCEs) then determine PCE address by performing S-NAPTR Query and SRV Query, A/AAA record lookup respectively.
4. PCCs (or other PCEs) then determine PCE scope, capability, PCE domain, PCE neighboring domain(s) by using DNS TXT record.
Protocol Extensions

- The NAPTR service field format defined by the S-NAPTR DDDS application in [RFC3958] follows this ABNF[RFC5234]:

  ```
  service-parms = [ [app-service] *("":"" app-protocol)]
  app-service = experimental-service / iana-registered-service
  app-protocol = experimental-protocol / iana-registered-protocol
  experimental-service = "x-" 1*30ALPHANUMSYN
  experimental-protocol = "x-" 1*30ALPHANUMSYN
  iana-registered-service = ALPHA *31ALPHANUMSYN
  iana-registered-protocol = ALPHA *31ALPHANUMSYN
  ALPHA = %x41-5A / %x61-7A ; A-Z / a-z
  DIGIT = %x30-39 ; 0-9
  SYM = %x2B / %x2D / %x2E ; "+" / "-" / "."
  ALPHANUMSYN = ALPHA / DIGIT / SYM
  ; The app-service and app-protocol tags are limited to 32
  ; characters and must start with an alphabetic character.
  ; The service-params are considered case-insensitive.
  ```

- We refines the "iana-registered-service" tag definition for the discovery of PCE supporting a specific PCE application or capability as defined below:

  ```
  iana-registered-service =/ pce-service
  pce-service = "pce+ap" appln-id
  appln-id = 1*10DIGIT
  ; Application Identifier expressed as
  ; a decimal integer without leading
  ; zeros.
  ```

- We refines the "iana-registered-protocol" tag definition for the discovery of PCE supporting a specific transport protocol as defined below

  ```
  iana-registered-protocol =/ pce-protocol
  pce-protocol = "pce." pce-transport
  pce-transport = "tcp" / "tls.tcp"
  ```

For example: The NAPTR service field can defined as follows: 'PCE+ap1:pce.tcp'
Where ap1 is referred to pce application or service (i.e., Global Concurrent optimization application) and pce.tcp is referred to transport protocol that is used to transport pce service.
Protocol Extensions

• In addition, we use a structured format in its TXT-DATA field to carry additional PCE information.

• The format following the same syntax defined in section 2 of [RFC1464]:
  <owner> <class> <ttl> TXT "<attribute name>=<attribute value>"
Update after IETF87

- Complementary to RFC5088 and RFC5089.
- New coauthor:
  - Diego Lopez
- Change compared to v-01:
  - Allow Capability Query by extending NAPTR service field format
  - Define format of TXT record value field using syntax defined in RFC1464
  - allow NAPTR query for a specific PCE domain by linking PCE domain with DNS domain name (i.e., PCE domain added as subdomain of DNS domain name.
- Other extensions proposed by our author
  - Use “pce+acronym” instead of “pce+apX” in the NAPTR service field format
  - Apply regexp instead of using TXT record to return additional info.
Next Step

• (Re)requesting WG adoption