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

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

Qin Wu (sunseawq@huawei.com)
Dhruv Dhody (dhruv.dhody@huawei.com)
Daniel King (daniel@olddog.co.uk)
Diego R. Lopez (diego@tid.es)
IETF 88
Vancouver, Canada

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

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.

- 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"
```

Protocol Extensions

- In addtion, 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