IRO Discussion

Background

IRO is defined in RFC5440, it

- doesn't mention ordering of sub-objects;
- ask to ignore the L (loose bit);

Domain Sequence Draft [draft-ietf-pce-pcep-domain-sequence-05] suggested several IRO encoding options

- including a new "ordered" IRO type to specify ordering and use of loose bit.

Discussion on the mailing list suggested doing a survey to find out how people have implemented existing IRO

- What implications would be for clarifying the IRO definition

IRO Survey

An Informal survey started by chairs

- All inputs to be sent to chairs for confidentiality

Results to be anonymized and published

Output: draft-dhody-pce-iro-survey-00

- Informal Survey into Include Route Object Implementations in Path Computation Element communication Protocol

Survey Text

IRO Encoding

- Does your implementation construct IRO?
- Does your implementation construct the IRO as an ordered list always, sometimes or never?
- What criteria do you use to decide if the IRO is an ordered or unordered list?
- Does your implementation construct the IRO as strict or loose hops?

IRO Decoding

- Does your implementation decode IRO?
- Does your implementation interpret the decoded IRO as an ordered list always, sometimes or never?
- What criteria do you use to decide if the IRO is an ordered or unordered list?
- Does your implementation interpret the IRO as strict or loose hops?

Impact

- Will there be an impact if RFC 5440 is updated to state that the IRO is an ordered list?
- Will there be an impact if RFC 5440 is updated to state that the IRO is an unordered list?
- Will there be an impact if RFC 5440 is also updated to allow IRO sub-objects to use the loose bit (L-bit)?

Respondents

- Are you a Vendor/Research Lab/Software House/Other?
- Is the implementation for a shipping product, product under development or a prototype?

4

Next Step

WG
- If you have an implementation, please respond to the survey!

Publish the survey result
- with recommendation

If update is needed
- Publish a new draft

Handle Domain-Sequence draft
- Based on the output of the survey

Backup Slides

IRO

The IRO (Include Route Object) is optional and can be used to specify
that the computed path MUST traverse a set of specified network
elements. The IRO MAY be carried within PCReq and PCRep messages.
When carried within a PCRep message with the NO-PATH object, the IRO
indicates the set of elements that cause the PCE to fail to find a
path.

IRO Object-Class is 10.

IRO Object-Type is 1.

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                         |
//                      (Sub-objects)                    |
|                                                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Sub-objects: The IRO is made of sub-objects identical to the ones
   defined in [RFC3209], [RFC3473], and [RFC3477], where the IRO sub-
   object type is identical to the sub-object type defined in the
   related documents.

   The following sub-object types are supported.

        Type   Sub-object
         1   IPv4 prefix
         2   IPv6 prefix
         4   Unnumbered Interface ID
        32   Autonomous system number

   The L bit of such sub-object has no meaning within an IRO.

7

IRO Encoding Options in Domain Sequence Draft

A New IRO Type to be used in inter-domain scenarios to denote domain-sequence

- (a.1) New IRO Type with domain-sequence sub-objects only
- (a.2) New IRO Type with mix of intra and inter-domain sub-objects, with strict ordering for inter-domain

Existing IRO - with focus of the draft only to define new sub-objects

- (b) Existing IRO Type with text clarifying the handling and processing rules to cover inter-domain cases

(a.1) New IRO for domain-sequence

A new IRO Object Type is used for the Domain-Sequence only

With strict order.

Support for loose hop.

Clear separation of scope.

Two IRO-Type may be included in PCReq

IRO Type 1 for intra-domain (no strict order).

IRO Type 2 for domain-sequence related subobjects.

Require change in PCReq message format - <iro-list> ☹.

(a.2) New IRO both intra and inter-domain

A new IRO Object Type is used to include both intra nodes and inter-domains nodes

With strict order for domain sub-objects

Support for loose hop

Clear separation of scope

Only the new IRO type 2 included in PCReq

May contains the intra domain network nodes & also domain sub-objects.

No need to change the PCReq message format.

(b) Existing IRO Type

An existing IRO Object Type is used to include both intra nodes and inter-domains nodes

- Existing processing rules
- No ordering for domain sub-objects ☹
- No support for loose hop ☹
- No separation in scope ☹

Only the existing IRO type 1 included in PCReq

- Intra domain network nodes and also domain sub-objects.
- No need to change the PCReq message format.

Strict Order

- PCE to determine the order
- May lead to crankback
- Order can be easily specified in configuration or determination via Parent PCE.

Loose

- Existing IRO Type 1 do not support loose hop

Scope

- All nodes in same IRO List without order.
- PCE responsible to determine the scope

Comparison

	(a.1) New IRO Type with domain-sequence sub-objects only	(a.2) New IRO Type with mix of intra and inter-domain sub-objects	(b) Existing IRO Type
Support Ordering?	Yes	Yes	No
Support Loose hop?	Yes	Yes	No
Consistent with PCReq Format?	No	Yes	Yes
Allow Separation of Scope?	Yes	Yes	No

Thanks!