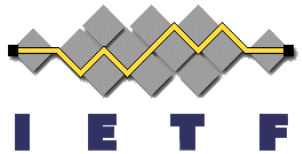
BGP Enhanced Dynamic Capability

IETF 124

Enke Chen, Palo Alto Networks

Srihari Sangli, HPE



Agenda

- Problem Statement
- Available mechanisms
- Enhanced Dynamic Capability
- Next Steps

Revising Capability

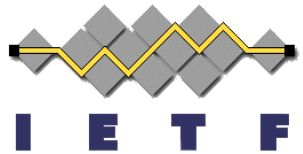
- Certain capabilities (after coming into effect) change the format of the message. For e.g. add-path, 4-octet AS, etc.

- Add/remove of such capabilities requires session reset and the session reset results in network churn with data traffic impact.

Available mechanisms

- Capabilities announced in OPEN message (RFC4271)
  - Session starts off with new format and the message format do not change during session lifetime, but its restrictive.
  - Results in session reset and causes network wide impact.
- Dynamic Capability (draft-ietf-idr-dynamic-cap-17)
  - Does not support revision of capabilities that change message structure.

Enhanced Dynamic Capability



- It's a New Capability, announced via OPEN message.
- Introduces new message type carrying the list of capabilities allowed for revision.
- Supports revision of all capabilities during lifetime of a session
  - Uni-directional dependency. E.g., Route Refresh
  - Bi-directional dependency. E.g., add-path
  - Single-instance and Multi-Instance.
- Enhanced Dynamic Capability can be refreshed too!
  - Helps in Hitless Upgrade.

Terminology

- Initiator: router initiating the revision
- Receiver: router acknowledging the revision

Enhanced Dynamic Capability

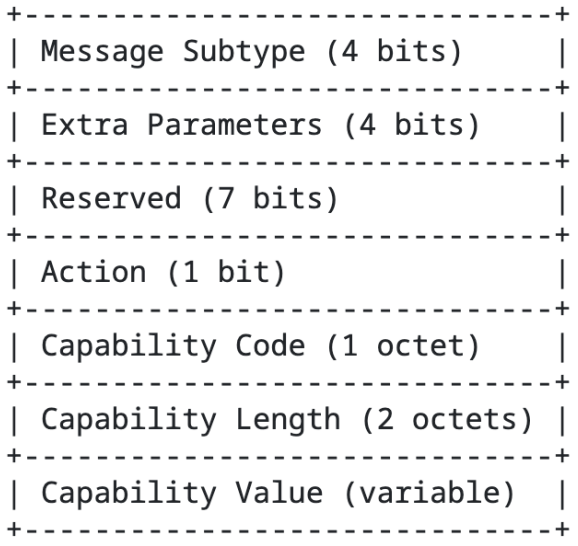
- Enhanced Dynamic Capability message
  - 4 subtypes supported

Message type	Value	Comment
Init	0	Initiator initiates revision
Ack	1	Receiver acknowledges revision
AckConfirm	2	Initiator confirms received Ack
Nack	3	Receiver rejects revision

  - Extra Parameters provide additional meaning

Message type	Value of Extra Parameter	Comment
Ack	1	Demarcation. Capability revision applied
AckConfirm	1	Demarcation. Capability revision applied

Message type	Value of Extra Parameter	Comment
Nack	1	Capability add: Existing
	2	Capability delete: Non-Existing
	3	Capability add/delete: pending
	4	Unexpected event: FSM
	5	Capability malformed



Enhanced Dynamic Capability

- Handling multi-instance capability
  - Any capability (e.g. ADD-PATH) that has AFI/SAFI extensions is treated as multi-instance capability
  - Each instance must be added or removed individually. For e.g. each AFI/SAFI instance of MP-REACH capability
  - If multi-instance capability is removed, then that capability is removed in its entirety including all its instances
- Back 2 back revisions
  - A capability instance cannot be revised again until the current revision has been completed.
  - However, another capability or capability instance can be revised in parallel.

Enhanced Dynamic Capability

- Demarcation Indicator (DI)
  - Indicates that the capability revision will take effect
  - It gives hint to the remote peer to process messages in the new format as per capability revision.
  - For uni-directional capabilities, the Receiver sets DI in the Ack message.
  - For bi-directional capabilities, both peers will check for bi-directional dependency.
    - DI is set by Receiver in Ack message and Initiator in the AckConfirm message.

Procedure for capability revision

- Initiator announces ‘add’ or ‘remove’ action for capability instance only if the Receiver has enabled the revision, and the Receiver can either ‘Ack’ or ‘Nack’.
- **Ack**: Receiver accepts the revision, sends Ack message, and Initiator confirms the receipt of Ack with AckConfirm.
- **Nack**: Receiver rejects the revision, sends Nack message with one of the following reasons, and the Initiator terminates revision.
  - Addition of existing capability
  - Removal of non-existent capability
  - Pending state
  - FSM error
  - Capability malformed

Bi-directional capability in effect

- Receiver checks for bi-directional dependency, marks DI.
- Receiver puts capability revision into effect based on following conditions.
  - Revision is accepted and Ack is sent to Initiator
  - Case-1: Receiver already announced via OPEN.
  - Case-2: Receiver has initiated ‘add’ for the same capability instance and it has sent ‘AckConfirm’.

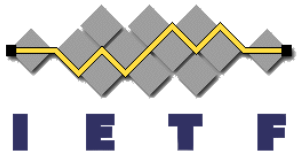
Bi-directional capability in effect

- Initiator checks for bi-directional dependency, marks DI.
- Initiator puts capability revision into effect based on following conditions.
  - Receiver has accepted revision and AckConfirm is sent by Initiator.
  - Case-1: Receiver already announced via OPEN
  - Case-2: Receiver has initiated ‘add’ for the same capability instance and Initiator has sent ‘Ack’.

Next steps

Comments welcome!

Request for adoption



Thank you