BGP Dynamic Capability

IETF 123

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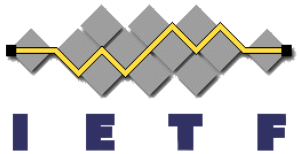

Agenda

- Updates in ver-17
- Enhanced Dynamic Capability
- Next steps

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Dynamic Capability: Update (1 of 6)

- Revising the capability during lifetime of a session
  - Local speaker initiates the revision of one of its capability instances
  - Remote speaker acknowledges the revision of the capability instance
- Controlling what capabilities can be revised
  - Local speaker can revise its capability instance only if the remote speaker has the plumbing to support the revision.
- Dynamic Capability is a capability
  - Value field contains the list of the capabilities that local speaker has the plumbing to support revision.
  - Each speaker announces the capability via OPEN message indicating that it can handle Dynamic Capability message.

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Dynamic Capability: Update (2 of 6)

- Demarcation - an important step
  - Upon identification of demarcation, the capability revision goes into effect.
  - Until then, the state of capabilities and BGP operations do not change.
- Sequence of revisions
  - Multiple revisions for a capability instance must be serialized.
  - Different capability-instances can be revised in parallel.
- Sequence Number redefinition
  - No validation enforced. It's repurposed for diagnostic purposes only.
- Single-instance and Multi-instance capabilities
  - Multi-Protocol extensions capability is multi-instance capability, rest are single-instance capability.

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Dynamic Capability: Update (3 of 6)

- Two-way handshake
  - Ack-Request is mandatory for all capability revisions
  - Upper time bound for capability revision. Upon timeout the in-progress revision is discarded.
  - Initiator encodes only one capability instance in the Dynamic Capability Message.
  - Receiver must be capable to handling multiple capability instances in the message (for backward compatibility with prior versions)
- Scoping down the dynamic revision (Limitation)
  - Capability revision supports single-instance and multi-instance capabilities except those that change the structure of the message.

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Dynamic Capability: Update (4 of 6)

- Error Handling
  - Any error encountered results in NOTIFICATION & ongoing capability revision is discarded
  - Subcode "Unknown Sequence Number" deprecated.
- Dynamic Capability can be revised too!
  - A BGP speaker can revise the list of capabilities it supports for revision.
  - The Dynamic Capability itself must be listed in the Dynamic Capability Value in the OPEN message.
  - When remote speaker revises its capabilities, the local speaker can initiate revision of the new capability.
  - Relevant for incremental deployment and hitless upgrade.

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Dynamic Capability: Update (5 of 6)

- Procedure to revise a Capability
  1. Local and Remote BGP speakers announce that they are capable of “Dynamic Capability”
  2. Remote BGP speaker lists the capabilities that it can support the revision
  3. Local BGP speaker initiates the capability revision
  4. Remote BGP speaker acknowledges and enable peer’s capability revision
  5. Local BGP speaker receives acknowledgement enable the capability revision

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Dynamic Capability: Update (6 of 6)

- Backward Compatibility
  - New Initiator always requests for Acknowledgement, Old Receiver honors it
  - New Receiver honors Ack-Req if Old Initiator requests it.

(Legend: New=Version -17.txt or newer; Old=Version -16.txt or older)

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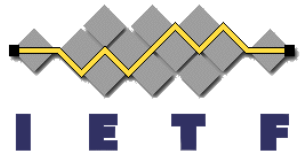
Enhanced Dynamic Capability



- Certain capabilities change the structure of the BGP Update message.
  - The Dynamic Capability does not support dynamic revision.
  - E.g. add-path, 4-octet AS
- Enhanced Dynamic Capability `draft-chen-idr-enhanced-dynamic-cap-00` is proposed to address that.
  - Ack-Confirm and Nack for tighter co-ordination between peers.
  - Clear demarcation defined.
  - Supports dynamic revision of all capabilities.

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Dynamic Capability: Next Steps

- Comments from IDR community are most welcome!
- Appreciate feedback from vendors who have implemented the draft
- Appreciate feedback on the Enhanced Dynamic Capability draft.

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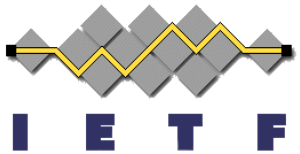

Thank you

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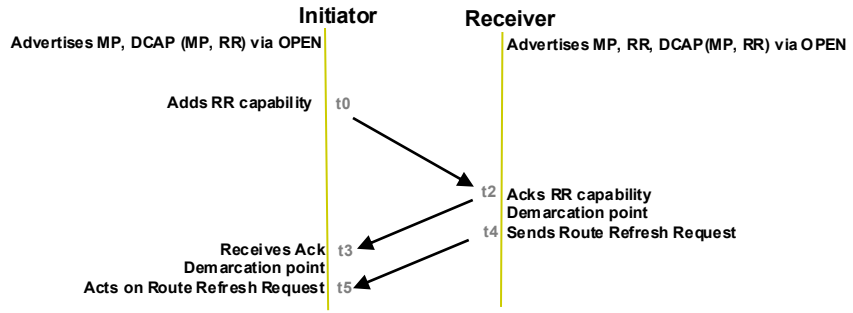
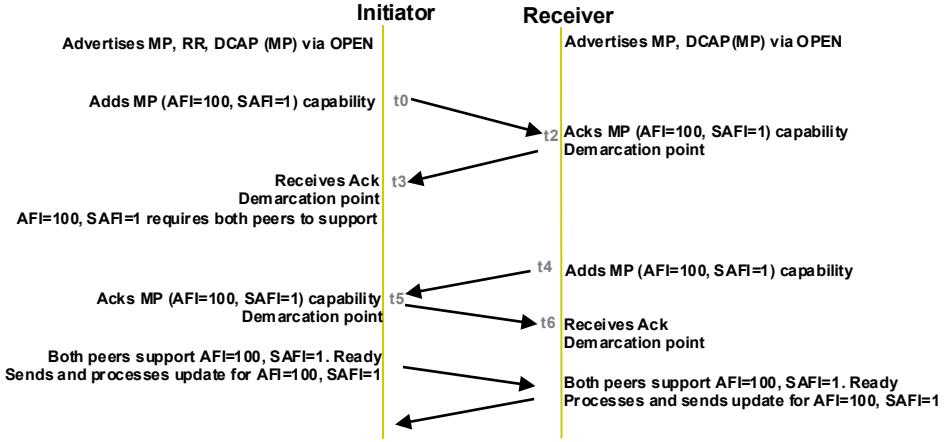
Dynamic Capability:
Deployment Use cases (1 of 2)

- Use case 1: Add single-instance capability
  - Receiver is capable of Multi-Protocol, Route Refresh and Dynamic Capability capabilities. Advertised via OPEN.
  - Initiator is capable of Multi-Protocol, and Dynamic Capability as advertised via OPEN.
  - Initiator adds Route Refresh dynamically. Upon FS completion, Receiver can send Route Refresh Request messages to Initiator.
- Use case 2: Add one capability-instance of multi-instance capability
  - Receiver and Initiator are capable of Multi-Protocol and Dynamic Capability capabilities. Advertised via OPEN.
  - Initiator adds new AFI/SAFI 100/1. Receiver acks it.
  - No messages exchanged for AFI/SAFI 100/1 as both peers need to support it.
  - Later, Receiver adds the AFI/SAFI 100/1 and Initiator acks it.
  - After FS completion, both peers exchange messages for AFI/SAFI 100/1





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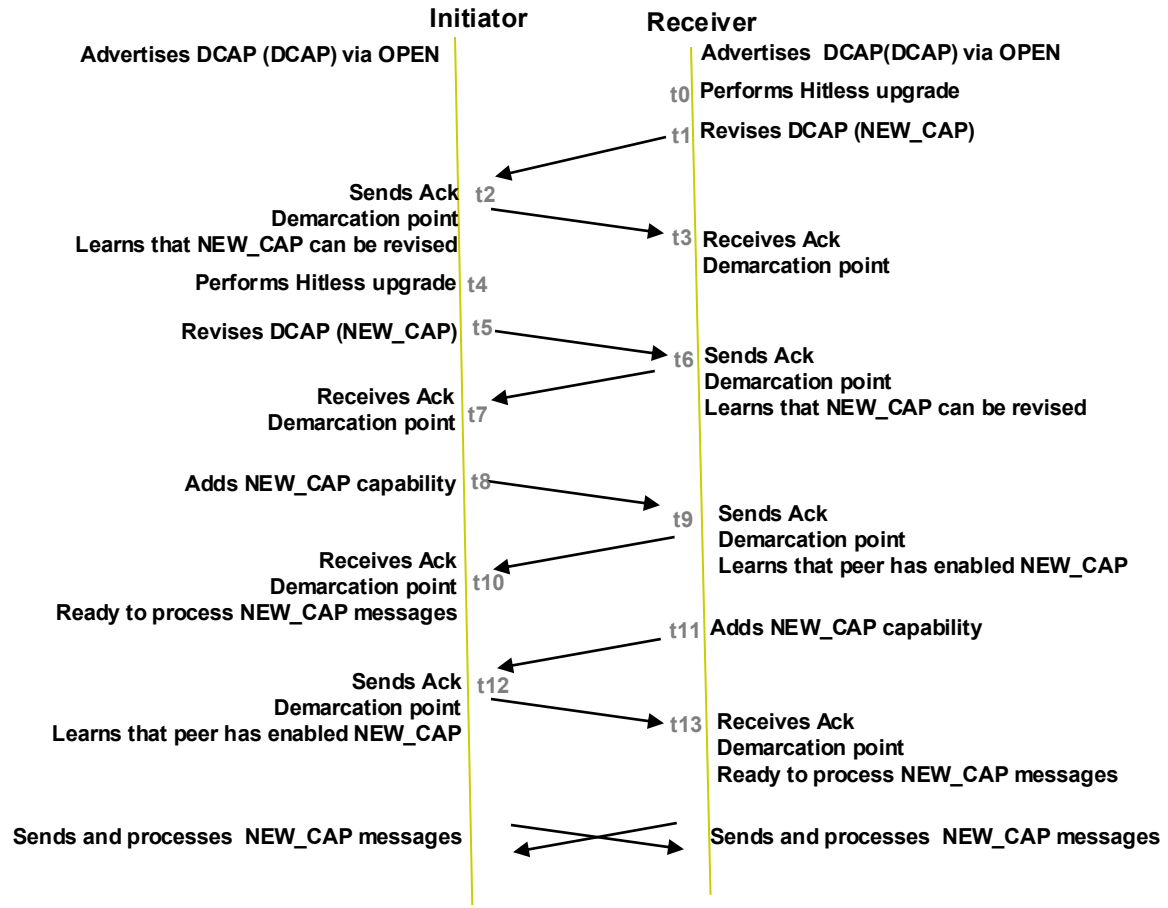
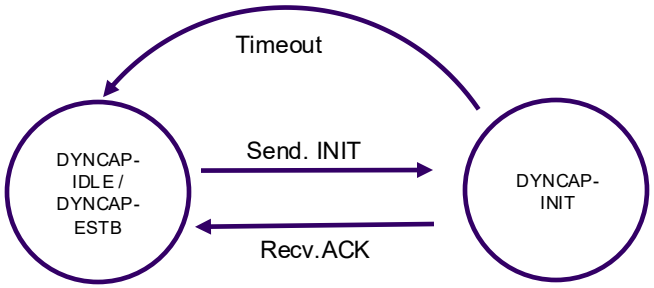
Dynamic Capability:
Deployment Use cases (2 of 2)

- Use case 3: Hit-less upgrade
  - BGP speakers are upgraded to support a new capability.
  - They both revise the Dynamic Capability listing the new capability, thus enabling for dynamic revision
  - Both BGP speakers adds the new capability



Dynamic Capability: Update (7 of 7)

- State transitions



Role	State	Trigger	Action	New State
Initiator	DynCap-Idle / DynCap-Estb	Operator revises capability	Send INIT-DCAP message	DynCap-Init
Initiator	DynCap-Init	Receives ACK-DCAP message	Capability revision put into effect	DynCap-Estb
Initiator	DynCap-Init	DynamicCapabilityTimer expires	Discard ongoing capability revision	DynCap-Idle
Receiver	DynCap-Idle / DynCap-Estb	Receives INIT-DCAP message	Send ACK-DCAP message Peer's capability revision put into effect	DynCap-Idle / DynCap-Estb

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