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## Dynamic Capability for BGP-4

draft-ietf-idr-dynamic-cap-03.txt

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## 2. Abstract

This document defines a new BGP capability termed "Dynamic
Capability", which would allow the dynamic update of capabilities
over an established BGP session. This capability would facilitate
non-disruptive capability changes by BGP speakers.

## [3](3). Introduction

Currently BGP capabilities [[BGP-CAP](BGP-CAP)] are only advertised in the OPEN
message during the session initialization. In order to enable a new
capability or remove an existing capability (such as an Address
Family support [[BGP-MP](BGP-MP)]), an established session needs to be reset,
which may disrupt other services running over the session.

This document defines a new BGP capability termed "Dynamic
Capability", which would allow the dynamic update of capabilities
over an established BGP session. This capability would facilitate
non-disruptive capability changes by BGP speakers.

## [4](4). Dynamic Capability

The Dynamic Capability is a new BGP capability [[BGP-CAP](BGP-CAP)].  The
Capability Code for this capability is specified in the "IANA
Considerations" section of this document.  The Capability Length
field of this capability is one octet.  The Capability Value field
consists of a list of capability codes (one-octet for each) for which
the dynamic revision is supported by a BGP speaker.

By advertising the Dynamic Capability to a peer in the OPEN, a BGP
speaker conveys to the peer that the speaker is capable of receiving
and properly handling the CAPABILITY message (as defined in the next
Section) from the peer after the BGP session has been established.

## [5](5). Capability Message

The CAPABILITY Message is a new BGP message type with type code 6.
In addition to the fixed-size BGP header [[BGP-4](BGP-4)], the CAPABILITY
message contains one or more of the following tuples:

```
            +------------------------------+
            | Action (1 octet)             |
            +------------------------------+
            | Capability Code (1 octet)    |
            +------------------------------+
            | Capability Length (1 octet)  |
            +------------------------------+
            | Capability Value (variable)  |
            +------------------------------+
```

The value of the Action field is 0 for advertising a capability, and

1 for removing a capability.

The triple <Capability Code, Capability Length, Capability Value> is
the same as defined in [BGP-CAP], and it specifies a capability for
which the "Action" shall be applied.


6. **Operation**

A BGP speaker that is willing to receive the CAPABILITY message (for
one or more capability codes) from its peer should use BGP
Capabilities Advertisement [BGP-CAP] to advertise the Dynamic
Capability for these capability codes.

A BGP speaker may send to its peer a CAPABILITY message that contains
one or more capability codes only if these capability codes are
listed in the Dynamic Capability of the OPEN message received from
its peer.

Upon receiving a CAPABILITY message from its peer, if a capability
code in the message is listed in the Dynamic Capability advertised by
the speaker to the peer, the BGP speaker shall update the capability
previously received from that peer based on the "Action" in the
message, and then function in accordance with the revised capability
for the peer.  The procedures specified in the "Error Handling"
section should be followed when an error is detected in processing
the CAPABILITY message.

The Dynamic Capability itself can not be revised dynamically via a
CAPABILITY message. The lifetime of the Dynamic Capability is the
duration of the BGP session in which the capability is advertised.

It is also noted that the dynamic capability revision may not be
feasible and should be disallowed for some capabilities.  One example
is the four-byte AS number capability [BGP-4BYTE-AS] as its dynamic
update could introduce ambiguity in parsing the UPDATE messages.

## 7. Error Handling

This document defines a new NOTIFICATION error code:

     Error Code       Symbolic Name

        7              CAPABILITY Message Error

The following error subcodes are defined as well:

     Subcode          Symbolic Name

        1              Invalid Action Value
        2              Invalid Capability Length
        3              Malformed Capability Value
        4              Unsupported Capability Code

If a BGP speaker detects an error while processing a CAPABILITY
message, it MUST send a NOTIFICATION message with Error Code
CAPABILITY Message Error. If any of the defined error subcode is
applicable, the Data field of the NOTIFICATION message MUST contain
the erroneous tuple <Action, Capability Code, Capability Length,
Capability Value> that causes the speaker to send the message.

If the Action field in the CAPABILITY message is other than 0 or 1,
then the error subcode is set to Invalid Action Value.

If the Capability Length field in the CAPABILITY message is incorrect
for a Capability Code, then the error subcode is set to Invalid
Capability Length.

If the Capability Value field in the CAPABILITY message is malformed
(the definition of "malformed" depends on the Capability Code), then
the error subcode is set to Malformed Capability Value.

If the Capability Code in the CAPABILITY message is not any of the
capability codes advertised in the Dynamic Capability by the speaker,
then the error subcode is set to Unsupported Capability Code.

**8**. IANA Considerations

   This document uses a BGP capability code to indicate that a BGP
   speaker supports the Dynamic Capability.  The capability code has
   been assigned by IANA per RFC 2842.


**9**. Intellectual Property Considerations

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   document. If any standards arising from this document are or become
   protected by one or more patents assigned to Cisco Systems, Cisco
   intends to disclose those patents and license them on reasonable and
   non-discriminatory terms.


**10**. Security Considerations

   This extension to BGP does not change the underlying security issues.


**11**. Acknowledgments

   The authors would like to thank Yakov Rekhter, Ravi Chandra, Dino
   Farinacci, Pedro Marques, Chandrashekhar Appanna, Derek Yeung, Bruno
   Rijsman and John Scudder for their review and comments.


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