Abstract

This document specifies general rules for interaction between the BAR (BIER Algorithm) and IPA (IGP Algorithm) fields defined in ISIS/OSPFv2 Extensions for BIER. The semantics for the BAR and IPA fields (when both or any of them is non-zero) defined in this document updates the semantics defined in RFC8444/RFC8401.

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC2119.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at https://datatracker.ietf.org/drafts/current/.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on November 30, 2019.
1. Introduction

In Bit Index Explicit Replication (BIER) architecture [RFC8279], packets with a BIER encapsulation header are forwarded to the neighbors on the underlay paths towards the BFERs. For each sub-domain, the paths are calculated in the underlay topology for the sub-domain, following a calculation algorithm specific to the sub-domain. The <topology, algorithm> could be congruent or incongruent with unicast. The topology could be a default topology, a multi-topology [RFC5120] topology. The algorithm could be a generic IGP algorithm (e.g. SPF) or could be a BIER specific one defined in the future.

In [RFC8401] and [RFC8444], an 8-bit BAR (BIER Algorithm) field and 8-bit IPA (IGP Algorithm) field are defined to signal the BIER specific algorithm and generic IGP Algorithm respectively and only value 0 is allowed for both fields in those two documents. This document specifies the general rules for the two fields and their interaction when either or both fields are not 0, and updates their semantics defined in [RFC8444] and [RFC8401].
2. General Rules for the BAR and IPA fields

For a particular sub-domain, all routers SHOULD be provisioned with and signal the same BAR and IPA values. When a BFR discovers another BFR advertising different BAR or IPA value from its own provisioned, it MUST treat the advertising BFR as incapable of supporting BIER for the sub-domain. How incapable routers are handled is outside the scope of this document.

It is expected that both the BAR and IPA values could have both algorithm and constraints semantics. To generalize, we introduce the following terms:

- **BC**: BIER-specific Constraints
- **BA**: BIER-specific Algorithm
- **RC**: Generic Routing Constraints
- **RA**: Generic Routing Algorithm
- **BCBA**: BC + BA
- **RCRA**: RC + RA

A BAR value corresponds to a BCBA, and a IPA value corresponds to a RCRA. Any of the RC/BC/BA could be "NULL", which means there are no corresponding constraints or algorithm.

When a new BAR value is defined, its corresponding BC/BA semantics MUST be specified. For a new IGP Algorithm to be used as a BIER IPA, its RC/RA semantics MUST also be clear.

For a particular topology X (which could be a default topology or multi-topology topology) that a sub-domain is associated with, a router calculates the underlay paths according to its provisioned BCBA and RCRA the following way:

1. Apply the BIER constraints, resulting in BC(X).
2. Apply the routing constraints, resulting in RC(BC(X)).
3. Select the algorithm AG as following:
   A. If BA is NULL, AG is set to RA.
   B. If BA is not NULL, AG is set to BA.
4. Run AG on RC(BC(X)).

2.1. When BAR Is Not Used

The BIER Algorithm registry established by [RFC8401] and also used in
[RFC8444] has value 0 for "No BIER specific algorithm is used". That
translates to NULL BA and NULL BC. Following the rules defined
above, the IPA value alone identifies the calculation algorithm and
constraints to be used for a particular sub-domain when BAR is 0.

2.2. Exceptions/Extensions to the General Rules

Exceptions or extensions to the above general rules may be specified
in the future for specific BAR and/or IPA values. When that happens,
compatibility with defined BAR and/or IPA values and semantics need
to be specified.

3. IANA Considerations

No IANA Consideration is requested in this document.

4. Acknowledgements

The authors thanks Alia Atlas, Eric Rosen, Senthil Dhanaraj and many
others for their suggestions and comments. In particular, the BCBA/
RCRA representation for the interaction rules is based on Alia’s
write-up.

5. References

5.1. Normative References

[ RFC2119 ] Bradner, S., "Key words for use in RFCs to Indicate
Requirement Levels", BCP 14, RFC 2119,
DOI 10.17487/RFC2119, March 1997,

Zhang, "Bit Index Explicit Replication (BIER) Support via
IS-IS", RFC 8401, DOI 10.17487/RFC8401, June 2018,

[ RFC8444 ] Psenak, P., Ed., Kumar, N., Wijnands, IJ., Dolganow, A.,
Przygienda, T., Zhang, J., and S. Aldrin, "OSPFv2
Extensions for Bit Index Explicit Replication (BIER)",
RFC 8444, DOI 10.17487/RFC8444, November 2018,
5.2. Informative References


Authors’ Addresses

Zhaohui Zhang
Juniper Networks
EMail: zzhang@juniper.net

Antoni Przygienda
Juniper Networks
EMail: prz@juniper.net

Andrew Dolganow
Nokia
EMail: andrew.dolganow@nokia.com

Hooman Bidgoli
Nokia
EMail: hooman.bidgoli@nokia.com

IJsbrand Wijnands
Cisco Systems
EMail: ice@cisco.com