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Z. Zhang
A. Przygienda
Juniper Networks
A. Dolganow
H. Bidgoli
Nokia
I. Wijnands
Cisco Systems
A. Gulko
Thomson Reuters
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BIER Underlay Path Calculation Algorithm and Constraints
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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](#).

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Table of Contents

1.	Introduction	2
2.	General Rules for the BAR and IPA fields	3
2.1.	When BAR Is Not Used	4
2.2.	Exceptions/Extensions to the General Rules	4
3.	IANA Considerations	4
4.	Acknowledgements	4
5.	References	4
5.1.	Normative References	4
5.2.	Informative References	5
	Authors' Addresses	5

[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:

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

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5. References

5.1. Normative References

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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

Arkadiy Gulko
Thomson Reuters

EMail: arkadiy.gulko@thomsonreuters.com