

Internet Engineering Task Force
Internet-Draft
Intended status: Experimental
Expires: August 27, 2011

M. Goyal, Ed.
University of Wisconsin Milwaukee
E. Baccelli
INRIA
J. Martocci
Johnson Controls
February 23, 2011

The Direction Field in Routing Metric/Constraint Objects Used in RPL
draft-goyal-roll-metrics-direction-00

Abstract

This document specifies a Direction field in the Routing Metric/Constraint objects used in RPL operation in low power and lossy networks.

Status of this Memo

This Internet-Draft is submitted to IETF 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 <http://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 August 27, 2011.

Copyright Notice

Copyright (c) 2011 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to BCP 78 and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as

described in the Simplified BSD License.

Table of Contents

1. Introduction	3
2. Terminology	3
3. The Direction Field	4
4. Security Considerations	5
5. IANA Considerations	5
6. References	5
6.1. Normative References	5
6.2. Informative References	5
Authors' Addresses	6

1. Introduction

Asymmetric links are a common observation in low power and lossy networks (LLNs) [sang_2010]. Many link-level routing metrics have a directional aspect. Although such routing metrics can be defined in a bidirectional manner so as to account for the link properties in both directions, this is not always desirable. In the context of RPL [I-D.ietf-roll-rpl], the IPv6 routing protocol for LLNs, it may be necessary to measure a link-level routing metric in a particular direction. For example, if the intent is to build a directional acyclic graph (DAG) specifically for the purpose of low latency communication to the DAG root, the routing metric must measure the link latency in Up direction, i.e., towards the DAG root, as defined in [I-D.ietf-roll-rpl]. Similarly, if a temporary DAG is being constructed to discover a point-to-point route towards a destination [I-D.ietf-roll-p2p-rpl], the routing metric must calculate the relevant link characteristic in Down direction, i.e., away from the DAG root, as defined in [I-D.ietf-roll-rpl]. Thus, there is a need to specify the directional aspect of a link-level routing metric.

Accordingly, this document defines a Direction field inside the Routing Metric/Constraint object header, defined in [I-D.ietf-roll-routing-metrics]. The Direction field is defined in two previously reserved bits inside the Routing Metric/Constraint object header. The modified Routing Metric/Constraint object header is backward compatible with its definition in [I-D.ietf-roll-routing-metrics].

2. Terminology

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

Additionally, this document uses terminology from [I-D.ietf-roll-terminology] and [I-D.ietf-roll-rpl]. Specifically, the term RPL node refers to an RPL router or an RPL host as defined in [I-D.ietf-roll-rpl].

indicating the partial nature of the recorded metric.

- o If the object is an aggregated metric, i.e., has C=0 and R=0 fields, the RPL node MUST drop the DIO containing the object.
- o If the object is a mandatory constraint, i.e., has C=1 and O=0 fields, the RPL node MUST drop the DIO containing the object.
- o If the object is an optional constraint, i.e., has C=1 and O=1 fields, the RPL node MAY drop the DIO containing the object or it MAY continue processing rest of the DIO ignoring this object.

4. Security Considerations

TBA

5. IANA Considerations

This document does not have any IANA considerations.

6. References

6.1. Normative References

[I-D.ietf-roll-routing-metrics]
Vasseur, J., Kim, M., Pister, K., Dejean, N., and D. Barthel, "Routing Metrics used for Path Calculation in Low Power and Lossy Networks", draft-ietf-roll-routing-metrics-17 (work in progress), January 2011.

[I-D.ietf-roll-rpl]
Winter, T., Thubert, P., Brandt, A., Clausen, T., Hui, J., Kelsey, R., Levis, P., Pister, K., Struik, R., and J. Vasseur, "RPL: IPv6 Routing Protocol for Low power and Lossy Networks", draft-ietf-roll-rpl-18 (work in progress), February 2011.

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

6.2. Informative References

[I-D.ietf-roll-p2p-rpl]
Goyal, M., Baccelli, E., Brandt, A., Cragie, R., Martocci,

J., and C. Perkins, "Reactive Discovery of Point-to-Point Routes in Low Power and Lossy Networks", draft-ietf-roll-p2p-rpl-02 (work in progress), February 2011.

[I-D.ietf-roll-terminology]

Vasseur, J., "Terminology in Low power And Lossy Networks", draft-ietf-roll-terminology-04 (work in progress), September 2010.

[sang_2010]

Sang, L., Arora, A., and H. Zhang, "On Link Asymmetry and One-way Estimation in Wireless Sensor Networks", ACM Transactions on Sensor Networks Volume 6, Number 2, February 2010.

Authors' Addresses

Mukul Goyal (editor)
University of Wisconsin Milwaukee
3200 N Cramer St
Milwaukee, WI 53201
USA

Phone: +1 414 2295001
Email: mukul@uwm.edu

Emmanuel Baccelli
INRIA

Phone: +33-169-335-511
Email: Emmanuel.Baccelli@inria.fr
URI: <http://www.emmanuelbaccelli.org/>

Jerald Martocci
Johnson Controls
507 E Michigan St
Milwaukee, WI 53202
USA

Phone: +1 414-524-4010
Email: jerald.p.martocci@jci.com

