Network Working Group
Request for Comments: 5115
Category: Standards Track

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January 2008

Telephony Routing over IP (TRIP) Attribute for Resource Priority

Status of This Memo

Abstract

This document defines a new attribute for the Telephony Routing over IP (TRIP) protocol. The attribute associates protocols/services in the PSTN offering authorized prioritization during call setup that are reachable through a TRIP gateway. Current examples of preferential service in the Public Switched Telephone Network (PSTN) are Government Emergency Telecommunications Service (GETS) in the U.S. and Government Telephone Preference Scheme (GTPS) in the U.K. The proposed attribute for TRIP is based on the NameSpace.Value tuple defined for the SIP Resource-Priority field.

1. Introduction

An IP telephony gateway allows nodes on an IP-based network to communicate with other entities on the circuit switched telephone network. The Telephony Routing over IP (TRIP) protocol [rfc3219] provides a way for nodes on the IP network to locate a suitable gateway through the use of Location Servers. TRIP is a policy-driven, inter-administrative domain protocol for advertising the reachability, negotiating the capabilities, and specifying the attributes of these gateways.

The TRIP protocol is modeled after BGP-4 [rfc4271] and uses path-vector advertisements distributed in a hop-by-hop manner (resembling a Bellman-Ford routing algorithm) via Location Servers. These Location Servers are grouped in administrative clusters known as Internet Telephony Administrative Domains (ITADs). A more extensive framework discussion on TRIP can be found in [rfc2871].

This document defines a new attribute that has been registered with IANA. The purpose of this new attribute, and the rationale behind its specification, is explained in the following sections.

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].

2. Emergency Telecommunications Service

Emergency Telecommunications Service is a broad term that refers to the services provided by systems used to support emergency communications. One example of these systems is the U.S. Government Emergency Telecommunications Service (GETS). This system currently operates over the U.S. Public Switched Telephone Network (PSTN) as a pay-per-use system by authorized personnel. It uses the T1.631-1993 ANSI standard [ANSI] to signal the presence of the National Security / Emergency Preparedness (NS/EP) codepoint in an ISDN User Part (ISUP) Initial Address Message (IAM) for Signaling System No. 7 (SS7). A key aspect of GETS is that a signaling standard in the U.S. PSTN is used to convey the activation/request of the GETS service.

From a protocol perspective, other examples of priority (and which can be argued as emergency/disaster related) standards are the H.460.4 ITU [itu460] standard on Call Priority designation for H.323 calls, and the I.255.3 [itu255] ITU standard on Multi-Level Precedence and Preemption Service. The latter has been integrated into private telephony systems like AUTOVON. In both cases, signaling codepoints exist to distinguish telephony calls by authenticated and prioritized end-user from the normal end-user. The form of this distinction varies and is outside the scope of this document. [rfc3689] and [rfc3690] provide additional information on ETS and its requirements.

3. SIP Resource-Priority Effort

The initial discussions in the IEPREP working group list, along with the presentation at the Adelaide IETF [ADEL00], led to strawman requirements to augment SIP to have the ability to prioritize call signaling. This effort was then advanced formally in the SIPPING working group so that SIP would be able to prioritize access to circuit-switched networks, end systems, and proxy resources for emergency preparedness communication [rfc3487].

The requirements in [rfc3487] produced the corresponding document [rfc4412] in the SIP working group, which defines a new header for SIP called Resource-Priority. This new header, which is optional, is

divided into two parts: a NameSpace and a Value. The NameSpace part uniquely identifies a group of one or more priorities. The Value part identifies one of a set of priorities used for a SIP message.

3.1. Benefits

There are three basic benefits derived from the addition of the Resource Priority header in SIP. The first is an ability to signal the priority within a SIP message to other entities in an IP network. The caveat is that some entities may not recognize/support the priority or namespace, but at least the ability to signal the priority with respect to resources has been specified in the SIP protocol.

The second benefit is that telephony-related protocol/codepoints from other standards can have a corresponding mapping to SIP NameSpace and Value tokens in the Resource-Priority header. Hence, the current NS/EP codepoint in ANSI standard T1.631-1993 could have a corresponding NameSpace.Value token set for the IETF standards body. And as a result, this mapping would facilitate the transparent bridging of signals (i.e., codepoints) between standards defined by various organizations -- be they private or public.

The third benefit of the Resource-Priority header, and its definition of alphanumeric tokens, is that it is highly versatile. The NameSpace allows for a wide set of priorities to be defined and updated, if the need arises, by simply defining a new NameSpace token. Hence, there is no reliance on a single set of priorities applied for all cases.

3.2 Issue

Having defined a means of signaling priority through gateways, the follow-on question arises of how does one determine which gateways support a given NameSpace. The dissemination of this type of information is within the scope of TRIP. However, the current specification of TRIP does not include a component that advertises associations of gateways with specific NameSpaces. To address this omission, the following section defines a new TRIP attribute that associates one or more NameSpaces with a gateway.

4. New Attribute: ResourcePriority

This section provides details on the syntax and semantics of the ResourcePriority TRIP attribute. Its presentation reflects the form of existing attributes presented in Section 5 of [rfc3219].

Attribute Flags are set to the following:

```
Conditional Mandatory: False
Required Flags: Not Well-Known, Independent Transitive
Potential Flags: None
TRIP Type Code: 12
```

There are no dependencies on other attributes, thus Conditional Mandatory is set to "False".

Since the Resource-Priority field in SIP, with its corresponding NameSpace token, is optional, the ResourcePriority attribute in TRIP is also optional. Hence, it is set to "Not Well-Known".

The Independent Transitive condition indicates that the attribute is to be forwarded amongst all ITADs. The Location Server that does not recognize the attribute sets the Partial flag as well.

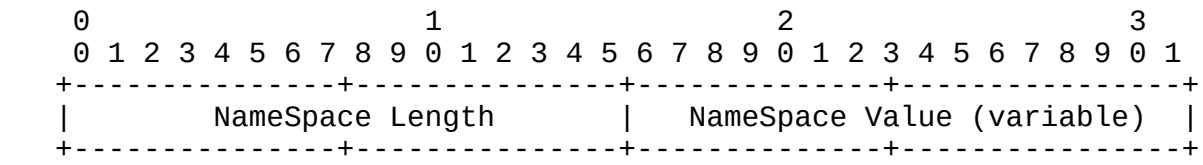
4.1. Syntax of ResourcePriority

The ResourcePriority attribute contains one or more NameSpace token identifiers. An initial set of identifiers is defined in [rfc4412], with subsequent identifiers to be found in the IANA registry. The syntax of the ResourcePriority attribute is copied from the "namespace" token syntax from [rfc4412], which in turn imported "alphanum" from [rfc3261], and is an alphanumeric value as shown below:

```
namespace = 1*( alphanum / "-" / "!" / "%" / "*" / "_" / "+"
                / "'" / "`" / "~" )
```

Note that an augmented version of Backus-Naur Form is found in [rfc4234].

Since NameSpaces are arbitrary in length, each tuple consists of a Length value with a NameSpace value as shown in the figure below. There is no padding between tuples.



It is important to note that the priority (i.e., "r-priority" token syntax) from [rfc4412] is NOT used in the ResourcePriority attribute. This is because the objective of the attribute is to advertise the NameSpace associated with a gateway and not the individual priorities within that NameSpace.

4.2 Additional TRIP Considerations

Section 5.12 of TRIP lists a number of considerations that should be addressed when defining new attributes. The first three considerations (use of the attribute, its flags, and syntax) have been discussed above in this section. The final three considerations are the following.

4.2.1. Route Origination

The ResourcePriority attribute is not well-known. If a route has a ResourcePriority attribute associated with it, the Location Server (LS) MUST include that attribute in the advertisement it originates.

4.2.2. Route Aggregation

Routes with differing ResourcePriority token values MUST NOT be aggregated. Routes with the same token values in the ResourcePriority attribute MAY be aggregated and the same ResourcePriority attribute attached to the aggregated object.

4.2.3. Route Dissemination and Attribute Scope

An LS MUST include the ResourcePriority attribute when communicating with peer LSs within its own domain.

If received from a peer LS in another domain, an LS MUST propagate the ResourcePriority attribute to other LSs within its domain.

An LS MAY add the ResourcePriority attribute when propagating routing objects to an LS in another domain. The inclusion of the ResourcePriority attribute is a matter of local administrative policy.

5. Security Considerations

The document defines a new attribute for the TRIP protocol and has no direct security considerations applied to it. However, the security considerations for TRIP and its messages remain the same and are articulated in Section 14 of [rfc3219].

6. IANA Considerations

As described in Section 4 above, one new "TRIP attribute" has been defined. Its name and code value are the following:

Code	Attribute Name
12	ResourcePriority

These assignments are recorded in the following registry:
http://www.iana.org/assignments/trip-parameters

7. Acknowledgements

The authors appreciate review and subsequent comments from James Polk and Henning Schulzrinne.

8. References

8.1. Normative References

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