           **Requirements for Resource Priority Mechanisms for the Session
                          Initiation Protocol**

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Abstract

   This document summarizes requirements for prioritizing access to PSTN
   and proxy resources for emergency preparedness communications using
   the Session Initiation Protocol (SIP).

1 Introduction

   For voice-over-IP or, more generally, multimedia calls placed by
   authorized users during emergencies, there are four cases where
   certain calls may need to be treated with priority:

        1.   If PSTN gateway resources are scarce, authorized calls
             should be able to queue for resources and acquire outbound
             trunks with priority or, if local policy permits, preempt

an existing call.

2.   If a call originates from a circuit-switched network with
     multiple priority levels and traverses a VoIP network using
     SIP signaling on its way to another circuit-switched
     network with multiple priority levels, it is desirable that
     the priority information is not lost during transit.
     Similarly, calls originating on a VoIP terminal and
     terminating in the PSTN also need to be able to invoke the
     appropriate priority mechanism.

3.   Resources in networks may be managed based on SIP calls.
     (This is not always desirable or feasible due to the
     divergence of media and signaling paths and the limited
     ability of session setup messages to express traffic
     characteristics, but it may be the only available mechanism
     absent a resource reservation protocol.) In such cases,
     policy may grant emergency preparedness or MLPP calls
     prioritized access.

4.   In some circumstances, it may be appropriate to prioritize
     access to signaling resources (e.g., CPU cycles) in SIP
     proxies.

Thus, SIP signaling requires a mechanism that allows the caller to
indicate such priority.

In the PSTN and certain private networks, such as those run by
military organizations, calls are marked in various ways to indicate
priorities.

Below are some requirements for such a mechanism:

Not specific to one domain: The mechanism should not be specific
     to one country or particular priority mechanism. For
     example, there are currently at least four priority schemes
     in widespread use: Q.735, with five levels, the U.S.
     defense network and NATO with five levels, the United
     States GETS (Government Emergency Telecommunications
     Systems) scheme with implied higher priority and the
     British GTPS system ???.

Usage of existing namespaces: Since there are a number of
     existing resource priority schemes for both the PSTN and
     private networks, it is likely that hybrid or VoIP networks
     will inherit these naming schemes.

Extensibility: New naming schemes may need to be defined as

resource priority mechanism are applied in additional
private networks, or if a VoIP-specific priority scheme is
being defined.

Separation of indication and policy: The indication should not
request a particular detailed treatment, as it is likely
that this depends on the nature of the resource and local
policy.

Default behavior: Network terminals configured to use priority
scheme A may occasionally end up making calls in a network
that does not support such a scheme or the terminal may
have an older list of priorities in a namespace.

Multiple simultaneous schemes: Some user agents will need to
support multiple different priority schemes, as several
will remain in use in networks run by different agencies
and operators. (Not all user agents will have the means of
authorizing callers using different schemes, and thus may
be configured at run-time to only recognize certain
namespaces.)

Discovery: A terminal should be able to discover which priority
name spaces are supported by a particular proxy or user
agent (gateway).

Priority mechanisms can be roughly categorized by whether they use a
priority queue for resource attempts or whether they preempt existing
resource uses (e.g., calls). The choice between these mechanisms
depends on the operational needs and characteristics of the network,
e.g., on the number of active requests in the system and the fraction
of prioritized calls. Generally, if the number of prioritized calls
is small compared to the system capacity and the system capacity is
large, it is likely that another call will naturally terminate in
short order when a higher-priority call arrives. Thus, it is
conceivable that the system indication can sometimes cause
preemption, while otherwise it just

Some namespaces may inherently imply a preemption policy, while
others may be silent on whether preemption is to be used or not,
leaving this to local entity policy.

Similarly, the precise relationships between labels, e.g., what
fraction of capacity is set aside for each priority level, is also a
matter of local policy. This is similar to how differentiated
services labels are handled.

2 Relationship to Emergency Call Services

The resource priority mechanisms are used to have selected
individuals place calls with elevated priority during times when the
network is suffering from an emergency-induced shortage of resources.
Generally, calls for emergency help placed by non-officials (e.g.,
"911" and "112" calls) don't need resource priority under normal
circumstances. If such emergency calls are placed during emergency-
induced network resource shortages, the call identifier itself is
sufficient to identify the emergency nature of the call. Adding an
indication of resource priority may be less appropriate, as this
would require that all such calls carry this indicator. Also, it
opens another attack mechanism, where non-emergency calls are marked
as emergency calls. (If the entity can recognize the request URI as
an emergency call, it would not need the resource priority
mechanism.)

3 Security Requirements

Any resource priority mechanism can be abused to obtain resources and
thus deny service to other users. While the indication itself does
not have to provide separate authentication, any SIP request carrying
such information has higher authentication requirements than regular
requests.

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