Abstract

RFC 2486 [1] defines the need of a standardized format for identifying ISP subscribers for dial-up roaming operations. It introduced the Network Access Identifier (NAI) to fulfill this need. The NAI is provided by the mobile node to the dialed ISP during PPP authentication.

The ability to resolve an NAI for second and third generation cellular mobile nodes allow traditional cellular service providers to evolve their home cellular networks to provide cellular services, IP packet data services and so on with a single subscription using NAIs. Additionally, this allows cellular
Second and third generation cellular mobile nodes must perform a registration and authentication process with their wireless service provider before the mobile node user may initiate other operations (See [1] for examples). These mobile nodes do not support the programming of an NAI nor does the cellular registration message support the transfer of an NAI to the wireless access network. For example, North American cellular networks (e.g. AMPS, TDMA, CDMA) service mobile nodes that register with a Mobile Identification Number (MIN). The MIN is then associated with a cellular subscriber. MIN is shown here only as an example, the same general idea is applicable to other types of identifiers used in different access network types. For the same reasons stated in [1], it would be convenient if an option was available to provide the wireless subscriber identification in the form of an NAI during the wireless registration and authentication process. This draft proposes a solution to resolve NAIs from traditional mobile node identifiers.

1. Introduction

RFC 2486 [1] defines the need of a standardized format for identifying ISP subscribers for dial-up roaming operations. It introduced the Network Access Identifier (NAI) which is of the form user@realm to fulfill this need. The NAI is provided by the mobile node to the dialed ISP during PPP authentication.

The ability to resolve an NAI for second and third generation cellular mobile nodes allow traditional cellular service providers to evolve their home cellular networks to provide cellular services, IP packet data services and so on with a single subscription using NAIs. Additionally, this allows cellular providers to evolve their networks to be IP based.
be convenient if an option was available to provide the wireless subscriber identification in the form of an NAI during the wireless registration and authentication process. This draft proposes a solution to resolve NAIs from traditional mobile node identifiers.

Consider the following scenario to illustrate the NAI resolution required to register and authenticate wireless mobile nodes with their wireless service provider:

NAI enabled Wireless Service Provider owns the cellular service for Subscriber A (SUB A).

<table>
<thead>
<tr>
<th>SUB A</th>
<th>Wireless</th>
<th>NAI Enabled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellular</td>
<td>Mobile</td>
<td>Access</td>
</tr>
</tbody>
</table>

| | | event |
| | | | a |
| | | | b |
| | | | c |
| | | | d |

a  SUB A powers-on his second or third generation cellular mobile node. The act of powering on causes the cellular mobile mode to attempt a wireless registration. The registration message identifies the mobile node by its MIN.

b  The wireless access network receives the wireless registration message and from this message resolves an NAI based on the MIN sent by the cellular mobile node. The wireless access network sends an appropriate registration message to its NAI enabled home network.

c  The NAI enabled home network registers and authenticates wireless SUB A and sends an appropriate registration response back to the wireless access network.

d  The wireless access network receives the registration response from wireless SUB A’s home network and sends an appropriate wireless registration return result to SUB A’s cellular mobile node.
2. Terminology

This document uses the following terminology:

MIN Mobile Identification Number: A 10-digit number assigned to the mobile station.

3. Specification Language

The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [2].

4. NAI Resolution

There are many alternatives to resolve an NAI. This draft proposes a method by which an NAI resolution function could be developed in the wireless access network which can be used to map a wireless MNs identification (MIN) to an NAI.

The NAI is of the form user@realm. At the wireless access provider, using the wireless registration information, a temporary NAI may be constructed of the form <MIN>@realm. The IP address corresponding to the realm may then be resolved through DNS or other appropriate mechanisms. That resolution should return the IP address of the realm (i.e. the Service Provider owning the subscriber’s wireless service). The temporary NAI, <MIN>@realm, should then be supplied in the registration message to the wireless service provider identified by that IP address. The wireless service provider should receive the registration message and may decode the "user" component of the temporary NAI to lookup the subscriber’s NAI if it is, in fact, different from the temporary NAI.

For example, suppose a cellular mobile node sends a registration message to the wireless access network with a MIN of 9726841000. A table resident at wireless access network may be populated with a range of MINs covered by each entry. In this example, each range specifies only the most significant 6 digits and implicitly includes all subscriber numbers (last 4 digits) within the range:

<table>
<thead>
<tr>
<th>MIN RANGE</th>
<th>REALM</th>
</tr>
</thead>
<tbody>
<tr>
<td>214790 - 214799</td>
<td>abc_company.net</td>
</tr>
<tr>
<td>972680 - 972689</td>
<td>def_company.net</td>
</tr>
<tr>
<td>972700 - 972730</td>
<td>hij_company.net</td>
</tr>
</tbody>
</table>
In this case "def_company.net" is the ISP for the 9726841000 MIN. The resulting temporary NAI to use for IP address resolution and for routing of registration messages over the Internet would be: 9726841000@def_company.net.

Table lookups such as these have been widely used in cellular networks since the subscriber/terminal identifiers are: numeric, a maximum of 15 digits, and the leading digits typically defined a geographical region to facilitate routing. Further, ranges of subscriber/terminal identifications were assigned in blocks to service providers in each regions. As shown in the table, def_company.net is assigned all of the subscriber numbers from exchanges 680 through 689 inclusive. This facilitated scalability by alleviating access providers from a requirement of enumerating each MIN in their tables.

NOTE: The interface from the wireless access network to the wireless service provider network should use protocols produced by the IETF and is outside of the scope of this document. With the exception of the derivation of an NAI from a MIN, the means by which a cellular registration or authentication message is converted by the wireless access network to the relevant IETF protocol message(s) is outside the scope of this document.

5. Acknowledgments

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6. References


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