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REPORT FROM THE IP LOCATION INFORMATION WORKING GROUP

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REPORT FROM
THE
IP LOCATION INFORMATION WORKING GROUP

TERMS OF REFERENCE

Terms of reference for the IP Location Information Working Group are to:

- Scope the long term options that can facilitate the consistent use of location information on IP networks. This includes:
  - the options for a preferred information format
  - the options for signaling/transfer of that information format
  - related conventions/standards that might be of use in bilateral agreements,
  e.g. handling of incorrect/inconsistent location information.
  - any potential barriers to adoption, and options for addressing those barriers,
- Align its activity with Recommendation 8 of the DCITA Report "Examination of Policy and Regulation Relating to Voice over Internet Protocol (VoIP) Services", namely:
  - "Industry should be encouraged to find a technical solution to the issue of location information reliability in IP services. ACMA should work with domestic providers to ensure that any global solution can be adopted in Australia".
- Align its activity with international standards developments.

Deliverables are:

- A list of technology choices for use in a guideline on location information for services using IP networks (e.g. VoIP).
- Recommendation of a preferred option for a location information format.

LOCATION INFORMATION OPTIONS

A summary of the main long term options for location information are to develop a solution that:

1. is based on the current IP Multimedia Subsystem (IMS) architecture (developed in 3GPP/3GPP2/ETSI-TISPAN).
2. is based on an i2-style architecture (developed in NENA) with eventual migration to an i3/IETF ecrit architecture.
3. is some hybrid of options 2 and 3 e.g. IMS for large, managed networks (i.e. fixed and/or mobile networks), i2 migration to i3/ECRIT for any network and for interfacing with managed networks.
4. waits for the i2/NENA/i3/ecrit and IMS/3GPP approaches to converge.
5. is specific to Australia.

Given the Working Group consists of a number of subject matter experts rather than a more broadly representative group it is not appropriate at present to recommend a single solution. Some guidance on the above options is:

(i) A preference between Option 1 and Option 2 would probably depend on one's starting assumptions about network architecture;
(ii) Option 3 is a possible outcome in Australia, given previous examples of implementing more than one particular standards development e.g. Australia implemented multiple national CDMA and GSM networks.
(iii) Option 4 is the "wait" option.
(iv) Option 5 is not feasible – see further comments below;

In choosing a timeframe for any activity on location information one should note that Canada is progressing its implementation of IP location information. The initial national decision was followed by a proposal from four of the five ILECs and that proposal is now being readied for implementation. Funding from the Canadian government for IT systems development is anticipated to be made available in March 2007. Other countries such as the USA and UK are also making progress on similar implementations. All are aligned with the activities of the National Emergency Number Association (NENA) in North America and the IETF.

Supplementary comments on the options

1 – *current IMS (3GPP/3GPP2/ETSI-TISPAN) architecture*
This would suit the providers of large scale managed networks and other providers of networks and services that are based on the IMS architecture. It would require broadband providers to support a location determination function. There would be the associated need for roaming agreements between all IMS (VoIP) operators and all Internet access providers. It places a larger burden, and associated impediment to deployment, on broadband providers.

2 – *i2, migration to i3/ECRIT*
i2 is based on an Internet services model supporting decoupling between the access provider and voice service provider. It has been defined in a North American context, is transitioning into deployment in the Canadian context and has momentum in the UK. An evolution of the Australian emergency network functionality can be laid out to work into this architecture. It may support accurate cellular caller location as well.

3 – *Hybrid*
A hybrid may offer a compromise between options 1 and 2 but will add complexity in implementation (e.g. tracking of multiple location information sources) and the potential duplication of resources. However the reality is that there are a number of 3G networks deployed or in development in Australia that will align with 3GPP specifications, and a number of networks that will look to implement a solution for location information based on IETF RFCs.

4 – Wait for NENA and 3GPP to converge
Liaison statements between standards development organisations (SDOs) indicate that there has been consideration of the various developments in

different SDOs and there is likely to be some convergence between options 1 and 2 in future.

5 – Australian specific - Not recommended
There is no compelling evidence to suggest that the particulars of the Australian environment are any different to other environments. Such differences that may exist – due to regulatory or business legacy – are fairly second order and could be addressed without needing a unique architectural approach. As well, it would be inconsistent with Recommendation 8 of the DCITA Report which refers to a "global solution".

LIST OF TECHNOLOGY RECOMMENDATIONS

Location Information Format
The IETF's Presence Information Data Format – Location Object (PIDF LO) has emerged as the primary option for defining location information format. PIDF-LO permits the location information to be provided as either a civic (e.g. street) address or geodetic information (e.g. latitude/longitude plus uncertainty).

PIDF-LO is defined in RFC 4119 "A Presence-based GEOPRIV Location Object Format", which is located at http://tools.ietf.org/rfc/rfc4119.txt.

IETF RFCs that complement RFC 4119 include RFC 3825, which defines the DHCP option for "coordinate-based" (e.g. geodetic) location Information, and RFC 4676, which defines the DHCP option for civic address information.

RFC 4119 is referenced as an example in the definition of "Geographical Location Information" in 3GPP TS23.167 "Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS) emergency sessions".

Location Information Acquisition Protocol
The protocol specified in the i2 architecture for the acquisition of PIDF-LO is the HTTP Enabled Location Delivery (HELD). HELD is used by a device to query its location on a network and is independent of network type.

For information, the Open Mobile Alliance specified an application protocol "Mobile Location Protocol" (MLP) a few years ago for use in mobile networks. It is used by Telstra and supports geodetic information. MLP does not support civic addresses.

Signalling/transfer of location information
The definition of PIDF-LO information is independent of the choice of signaling.
One popular signalling approach for VoIP services is to use the Session Initiation Protocol (SIP). SIP is able to transfer PIDF-LO.
Another popular signalling approach for VoIP services is to use 3GPP specifications and, as mentioned above, 3GPP includes PIDF-LO as an example in 3GPP TS23.167.
PIDF-LO can also be sent in HTTP to a web service.

Related Conventions/Standards
Related working groups/standards that might be of use in bilateral agreements include:

(i) IETF activity in the Geographic Location/Privacy (geopriv) Working Group;
(ii) IETF activity in the Emergency Context Resolution with Internet Technologies (ecrit) Working Group;
(iii) ETSI-TISPAN activity in Emergency Telecommunications (EMTEL).
(iv) 3GPP TS23.167 "Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS) emergency sessions"
(v) The Geocoded National Address Format (G NAF)
(vi) AS/NZS 4819:2003 Geographic information - Rural and urban addressing

See the list of references at the end of this report for links to the above.

Potential Barriers To Adoption
Potential barriers to adoption, and options for addressing those barriers, identified in the Working Group include:

(i) the lack of incentive for an ISP to support a Location Information Server (LIS) when the ISP does not offer a voice service. This may be addressed by extending the LIS application to non-voice services and creating a commercial benefit from maintaining the LIS e.g. payment per request for location information.
(ii) privacy concerns. Options for addressing these concerns include the use of:
    a. existing arrangements, because they may be adequate;
    b. an opt in/opt out choice for sending location information;
    c. variable resolution e.g. full resolution for emergencies and law enforcement, moderate resolution for commercial interactions with a trusted organisation, less resolution for commercial interactions with an unknown organisation.
(iii) the maturity of international standards, which holds up the…
(iv) the development of available equipment, which holds up the…
(v) the deployment of NGNs. The scope for Communications Alliance to speed up international activity is only limited by industry willingness to contribute resources to the international standards developments. Other options are to leave development and deployment to commercial incentives, or to drive deployment through policy decision(s).
(vi) the (in)accuracy of databases such as for cable records or DHCP information. This includes establishing and using processes to maintain the databases. A commercial benefit from the use of location based services can provide an incentive to maintain databases.
(vii) achieving an acceptable level of location accuracy (which is linked to the need for database maintenance in vi above). This can be addressed by growing the number of trusted parties that also support the supply/transfer of location information.

OTHER NOTES ARISING FROM WORKING GROUP DISCUSSION

Access networks affect the available resolution for location information. For example, a network manager can more readily resolve location to:

(i) a DSLAM port in a DSL network,
(ii) a headend for a cable modem network, or
(iii) a base station for a mobile network

than to identify the location of an individual device or end user.

There are additional methods that can be used to improve location information resolution. For example, in a HFC cable network the cable from the headend to customers' premises is shared among a number of users and DHCP may be used to dynamically allocate addresses. A database look up linking the allocated network address to a cable modem and then linking that cable modem to a customer's street address improves the resolution of location information from the cable headend to the customer premises. As well, there are multiple options for locating devices/endpoints on mobile networks, for example those covered in the ACA discussion paper "Location, Location Location".

A trusted device can provide better resolution of location information. For example, a campus network might have a default location that identifies the position of the interface to a public network. If the campus is a trusted network, it can improve the provided location information through its more detailed knowledge of the campus network e.g. by maintaining a database with the location of individual network ports, by using a process for locating portable/mobile devices on campus.

A key point emerging from the above is the central role of providers in the access link (e.g. infrastructure owner, DSL provider, ISP) in determining location. A core network is not able to determine a user's location. Also, the large number of endpoints, with substantial diversity in capability, cannot be relied upon to provide or to contribute to accurate location information. In contrast, location information linked to the access network offers the best balance of a smaller number of points of contact (than the number of endpoints), with more reliable information sources that are more likely to be kept up-to-date.

ALIGNMENT OF ACTIVITY WITH RECOMMENDATION 8 OF THE DCITA REPORT

Implementation of a technical solution aligned with the above options 1, 2 or 3 would align with Recommendation 8 of the DCITA Report because it:

(i) would help improve location information reliability in IP services e.g. current arrangements for providing location information on VoIP calls to emergency service numbers in Australia is state based and more likely national; and
(ii) would be aligned with international standards development.

ALIGNMENT OF ACTIVITY WITH INTERNATIONAL STANDARDS DEVELOPMENTS

The Working Group has based its findings on input received about the latest international activity on location information for emergency calls and telecommunications networks, from within international standards groups such as:

- the National Emergency Number Association (NENA) in North America,
- the Open Mobile Alliance (OMA)
- the ATIS Emergency Services Interconnection Forum (ESIF) in North America,
- the 3rd Generation Partnership Project (3GPP),
- the 3rd Generation Partnership Project 2 (3GPP2); and
- and liaisons between:
    - NENA and ESIF;
    - 3GPP and ESIF;
    - ESIF and 3GPP;
    - NENA and 3GPP2; ATIS and 3GPP, 3GPP2,ETSI TISPAN, ETSI EMTEL, IEEE 802, IETF ecrit, IETF geopriv, IETF ieprep, ITU-T SG13, OMA, TR-41.4 and TR-45.2.

URLs / REFERENCES:

Organisations

ATIS Emergency Services Network Interfaces Task Force (ESIF):
http://www.atis.org/esif/index.asp

National Emergency Number Association (NENA): http://www.nena9-1-1.org/

ETSI Emergency Telecommunications (EMTEL):
http://www.emtel.etsi.org/overview.htm

IETF Emergency Context Resolution with Internet Technologies (ecrit) Working Group: http://www.ietf.org/html.charters/ecrit-charter.html

IETF Geographic Location/Privacy (geopriv) Working Group:
http://www.ietf.org/html.charters/geopriv-charter.html

Documents

Public Sector Mapping Agency (PSMA) Australia Geocoded National Address File (G-NAF).
Information on G-NAF is available from: http://www.psma.com.au/g-naf/

AS/NZS 4819:2003 - Geographic information - Rural and urban addressing (plus draft DR 05191 CP : Amendment 1 to AS/NZS 4819:2003)
Australian Standards are available from:
http://www.saiglobal.com/shop/Script/Provider.asp?Db=AS

IETF RFC 3693 Geopriv Requirements
IETF RFC 3825 DHCP option for Coordinate-based Location Configuration Information
IETF RFC 4119 A Presence-based GEOPRIV Location Object Format
IETF RFC 4676 Dynamic Host Configuration Protocol (DHCPv4 and DHCPv6) Option for Civic Addresses Configuration Information
IETF RFCs are available from: http://www.ietf.org/

NENA "NENA VoIP Recommended Methods for Determining Location to Support Emergency Calling Technical Information Document (TID" available from:
http://www.nena.org/media/files/08-505_20061221.pdf

3GPP TS23.167 Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS) emergency sessions
3GPP TS23.167 is available from:
http://www.3gpp.org/ftp/Specs/html-info/23167.htm

Communications Alliance was formed in 2006 to provide a unified voice for the Australian communications industry and to lead it into the next generation of converging networks, technologies and services.

In pursuing its goals, Communications Alliance offers a forum for the industry to make coherent and constructive contributions to policy development and debate.

Communications Alliance seeks to facilitate open, effective and ethical competition between service providers while ensuring efficient, safe operation of networks, the provision of innovative services and the enhancement of consumer outcomes.

It is committed to the achievement of the policy objective of the *Telecommunications Act 1997* - the greatest practicable use of industry self-regulation without imposing undue financial and administrative burdens on industry.

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