
Source: SA1
Title: CR to 22.071 on Accuracy of information and Indication of capability (Rel-7)
Document for: Approval
Agenda Item: 7.1.3

Meeting	SA Doc	TS No.	CR No	Rev	Rel	Cat	Subject	Vers. Current	Vers New	SA1 Doc
SP-24	SP-040300	22.071	070	-	Rel-7	C	Accuracy of information Indication of capability	6.7.0	7.0.0	S1-040514

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 Shenzhen, China, 10 - 14 May 2004

S1-040514
 Agenda Item: 8.4

CR-Form-v7	
CHANGE REQUEST	
⌘ 22.071 CR 070 ⌘ rev - ⌘ Current version: 6.7.0 ⌘	

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘ Accuracy of information – Indication of capability		
Source:	⌘ SA1 (Lucent Technologies)		
Work item code:	⌘ LCS2; EMC1	Date:	⌘ 10/05/2004
Category:	⌘ C	Release:	⌘ Rel-7
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	F (correction)		2 (GSM Phase 2)
	A (corresponds to a correction in an earlier release)		R96 (Release 1996)
	B (addition of feature),		R97 (Release 1997)
	C (functional modification of feature)		R98 (Release 1998)
	D (editorial modification)		R99 (Release 1999)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

Reason for change:	⌘ Networks may have the capability to provide accuracy better than cell-id. This CR permits the network to inform the requestor of this better accuracy capability in lieu of the better accuracy. This replaces the requirement for “best location possible”
Summary of change:	⌘ Capability of location accuracy with high level of QoS will be indicated to requestor of location information.
Consequences if not approved:	⌘

Clauses affected:	⌘ 4.3										
Other specs affected:	<table border="1" style="font-size: x-small;"> <tr> <td>Y</td> <td>N</td> </tr> <tr> <td>X</td> <td></td> </tr> <tr> <td></td> <td>X</td> </tr> <tr> <td></td> <td>X</td> </tr> </table>	Y	N	X			X		X	Other core specifications	⌘ 22.101
	Y	N									
	X										
	X										
	X										
		Test specifications									
		O&M Specifications									
Other comments:	⌘										

4.3 Quality of Service

4.3.1 Horizontal Accuracy

The accuracy that can be provided with various positioning technologies depends on a number of factors, many of which are dynamic in nature. As such the accuracy that will be realistically achievable in an operational system will vary due to such factors as the dynamically varying radio environments (considering signal attenuation and multipath propagation), network topography in terms of base station density and geography, and positioning equipment available.

The accuracy for location services can be expressed in terms of a range of values that reflect the general accuracy level needed for the application. Different services require different levels of positioning accuracy. The range may vary from tens of meters (navigation services) to perhaps kilometers (fleet management).

The majority of attractive value added location services are enabled when location accuracies of between 25m and 200m can be provided.

Based on decreasing accuracy requirement some examples of location services are provided in table 4.1. The LCS service shall provide techniques that allow operators to deploy networks that can provide at least the level of accuracy required by the regional regulatory bodies (e.g. Annex A).

Table 4.1; Example of location services with decreasing accuracy requirement

· Location-independent	Most existing cellular services, Stock prices, sports reports
· PLMN or country	Services that are restricted to one country or one PLMN
· Regional (up to 200km)	Weather reports, localized weather warnings, traffic information (pre-trip)
· District (up to 20km)	Local news, traffic reports
· Up to 1 km	Vehicle asset management, targeted congestion avoidance advice
· 500m to 1km	Rural and suburban emergency services, manpower planning, information services (where are?)
· 100m (67%)	U.S. FCC mandate (99-245) for wireless emergency calls using network based positioning methods
· 300m (95%)	
· 75m-125m	Urban SOS, localized advertising, home zone pricing, network maintenance, network demand monitoring, asset tracking, information services (where is the nearest?)
· 50m (67%)	U.S. FCC mandate (99-245) for wireless emergency calls using handset based positioning methods
· 150m (95%)	
· 10m-50m	Asset Location, route guidance, navigation

Accuracy may be independently considered with respect to horizontal and vertical positioning estimates. Some location services may not require both, others may require both, but with different degrees of accuracy.

Given that the location estimate is the best possible within the bounds of required response time, the location estimates of a fixed position UE (assuming several estimates are made) will reveal a 'spread' of estimates around the actual UE position. The distribution of locations can be described by normal statistical parameters and suggests that a small proportion of location estimates may lie outside of the acceptable Quality of Service (QoS) parameters for specific services (as determined by the network operator).

It may be possible to provide information on the confidence that can be associated with a location estimate. This may be used by location services to decide if a position update should be requested, for example, if the reported accuracy falls below a threshold determined by the LCS Client or Network Operator for a specific service.

It may also be possible to determine velocity (speed and heading) information from a location request.

When delivered with a location estimate, the confidence region parameters, speed and heading may allow an application to improve the service delivered to the UE user. Some examples are given below:

- a) Confidence Region: Simple measure of uncertainty that specifies the size and orientation of the ellipse in which an UE is likely to lie with a predetermined confidence (e.g. 67%). The size of the confidence region may be used by the network operator or the LCS Client to request an updated location estimate.
- b) Speed: enables e.g. congestion monitoring, and average travel time estimates between locations.
- c) Heading: the location estimate of a vehicle may be improved to identify the appropriate side of the highway. This may enable the provision of traffic information that relates only to the user's direction of travel.

For Value Added Services and PLMN Operator Services, the following is applicable:

Accuracy is application driven and is one of the negotiable Quality of Service (QoS) parameters.

The precision of the location shall be network design dependent, i.e., should be an operator's choice. This precision requirement may vary from one part of a network to another.

The LCS shall allow an LCS Client to specify or negotiate the required horizontal accuracy. The LCS shall normally attempt to satisfy or approach as closely as possible the requested or negotiated accuracy when other quality of service parameters are not in conflict. The achieved accuracy level of location information shall be indicated using the shapes and uncertainty areas defined in 3GPP TS 23.032 [2].

For Emergency Services (where required by local regulatory requirements) the following requirements shall be met:

- The LCS Server shall attempt to obtain the horizontal location of the calling UE, in terms of universal latitude and longitude coordinates, and shall provide this to an Emergency Service Provider. The accuracy shall be defined by local regulatory requirements. Annex A shows such requirements as exist in the United States.
- For Emergency Services within some countries, a network may be allowed to report accuracy at the cell id level. If the UE and the serving network are capable of delivering a more accurate location, indication of this capability may, as a national option, be supplied to the authorities along with the location. This indication will notify the authorities that they are able to request location with a high accuracy QoS.

NOTE: The LCS Server provides the location service capabilities but the mechanism by which location is reported to an emergency service provider is outside the scope of this service.