

3GPP2 S.R0019

Version 1.0.0

Version Date: September 22, 2000



3RD GENERATION  
PARTNERSHIP  
PROJECT 2  
"3GPP2"

# Location-Based Services System (LBSS)

## *Stage 1 Description*

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*Revision History*

***Version 1.0.0 Initial release by TSG-S***

***September 22, 2000***

*Note*

*This specification is based on the CTIA Standards Requirements Document Wireless Intelligent Network Enhancements to Support Location-Based Services [WIN Phase III] December 13, 1999.*

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**BASIC ASSUMPTIONS**

This section details the basic assumptions of Location-Based Services System (LBSS).

1. MS location may be specified as either of the following:
  - a. SYSTEM REFERENCE LOCATION (i.e., cell/sector)
  - b. GEOGRAPHIC LOCATION (latitude/longitude plus any combination of the other parameters listed below):
    - i. ALTITUDE
    - ii. ORIENTATION/DIRECTION
    - iii. VELOCITY
    - iv. ACCURACY/ERROR MARGIN for any or each parameter
2. MS location may be calculated either by the MS, the infrastructure, both individually, or both jointly (i.e., mobile-assisted). Regardless of the location calculation method, the location information will be specified as indicated above and will be consistent for all applications.
3. Once the MS location is known to the MS or known to the infrastructure, appropriate messaging will be provided to allow sharing of that specific location information with the infrastructure or with the MS respectively.
4. Either the MS or the infrastructure may request initiation of location determination calculations from the other entity including specification of required accuracy and data latency; however, when the requested action cannot be supported by the requested Entity, if provided, system messaging may allow negotiation of mutually acceptable location determination actions and associated specifications.
5. Location determination may be requested or initiated by either the MS or the infrastructure at any time in either of the following modes:
  - a. Idle mode (MS locked on to a service provider system but no call-in-process)
  - b. Call-in-process mode
6. Location Information Restriction (LIR) restricts presentation of the subscriber's location information to authorized applications. When LIR is active, the network may provide the location information only to those applications which are authorized, as indicated by the LIR, to receive the information.
7. The Location-Based Services System (LBSS) will provide support for user-selected privacy options as indicated herein. In the case of a mobile-originated emergency the handset shall override all user selectable location privacy options for the duration of that emergency call. For the purpose of this requirement, a mobile-originated emergency call can be a GECO call (see GECO Stage 1) or any other call to a Public Services Answering Point (PSAP) for which user operations or other handset-programmed functionality indicates that the call should be handled as a GECO call.
8. The LBSS shall provide security to prevent fraudulent access to location information.
9. In addition to location reporting on demand, automatic location reporting may be activated or deactivated by either the MS or by the infrastructure from the other Entity for any the following conditions, individually or in any combination:
  - a. Call origination
  - b. Call termination
  - c. Handoff
  - d. Upon specified system message on either forward or reverse links with provisions for specific system message parameter matching.
  - e. Periodic reporting in idle or call-in-process mode: The serving provider's infrastructure system shall have the ability to specify the maximum allowable reporting rate for periodic reporting operations, including the ability to change the reporting rate after it has been initiated.
  - f. Change in any previously reported location specification by an amount specified by the requesting Entity in idle or call-in-process mode. Again, the serving provider's infrastructure system shall have the ability to specify the maximum allowable reporting rate.
10. In roaming applications:
  - a. Only the serving system infrastructure participates in the location determination process, including the transfer of information in support of mobile-assisted location determination algorithms.

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- 1        b. MS requests to the infrastructure for location reporting, either on-demand or automatically, will be  
2        negotiated and served by the serving system.
- 3        c. At the discretion of the serving system, either the home or serving systems may request and negotiate  
4        location reporting from the MS.
- 5    11. In recognition of user privacy concerns, the mobile may support the following user options:  
6        a. LIR.
- 7        b. Disable mobile participation in all location determination processing and reporting, except for conditions  
8        that are exempt from LIR.
- 9    12. All associated air-interface, A-interface, and intersystem-interface messaging shall have specifications  
10    developed for the following functions:  
11        a. Request for initiation of location determination function from either Entity to the other with associated  
12        service negotiations.
- 13        b. Request for activation or deactivation of automatic location reporting operations from either Entity to the  
14        other with associated service negotiations.
- 15        c. Request by the mobile to the infrastructure to disable all location determination functions that identify both  
16        the identity of the mobile and its location.
- 17        d. Request for infrastructure-to-MS transfer of information in support of mobile-assisted location  
18        determination algorithms with associated service negotiations by either Entity to the other.
- 19    13. LBSS shall be capable of being supported on both 2G and 3G systems.
- 20    14. Any Entity which does not have the capability to support location services will continue to operate normally,  
21        even after receiving any LBSS message  
22  
23

1     **1.0 INTRODUCTION**  
2

3     **1.1 Purpose**  
4

5         This document defines LBSS for implementation in 3GPP2 systems. The location services functionality has been  
6         adopted from existing TR-45 standards as defined and also as described in the following text.  
7

8     **1.2 Scope**  
9

10        The scope of this document includes 3GPP2 system support required to facilitate Location-Based services.  
11

12     **2. REFERENCES**

13        **2.1 Normative References**  
14

15           3GPP2 Documents:

- 16           • *TSG-N Intersystem Interface Document*  
              N..S0004 – WIN Phase 2 (PN-4289)
- 17           TSG-S – *Services and Systems Aspects*
  - 18                S.R0001 – 3GPP2 Specifications List
  - 19                S.R0002 – 3G Capability Descriptions
  - 20                S.R0003 – System Capability Guide
  - 21                S.R0004 – System Implementation Guide
  - 22                S.R0005 – 3GPP2 Network Reference Model
  - 23                S.R0006 – Cellular Features Description
  - 24                S.Rxxxx – Location Information Restriction (LIR)

25        **2.2 Informative References**  
26  
27

28           TIA/EIA:

- 29           • *ANSI/TIA/EIA-41-D Cellular Radiotelecommunications Intersystem Operations;*  
30            Telecommunications Industry Association; December 1997.
- 31           • *TIA/EIA-IS-664 Cellular Features Description* Telecommunications Industry  
32            Association; January 1996.
- 33           CTIA Standards Requirements Document Wireless Intelligent Network Enhancements to  
34            Support Location-Based Services [WIN Phase III] December 13, 1999.

3.0 Network Interfaces

There has been much work performed on developing standardized interfaces for 3GPP2 LBSS and, in general, for all Emergency Services. The specifications development for LBSS should leverage, to the greatest extent possible, the work that has already been completed in these areas.

Figure 1 illustrates a subset of the 3GPP2 Network Reference (NRM). Shown are two “new” Network Elements that play a role in LBSS. The LSNE and LSME are analogous to the ESNE and ESME elements that were developed to support Emergency Services as described in TR-45 documents PN-3890 and PN-4288.

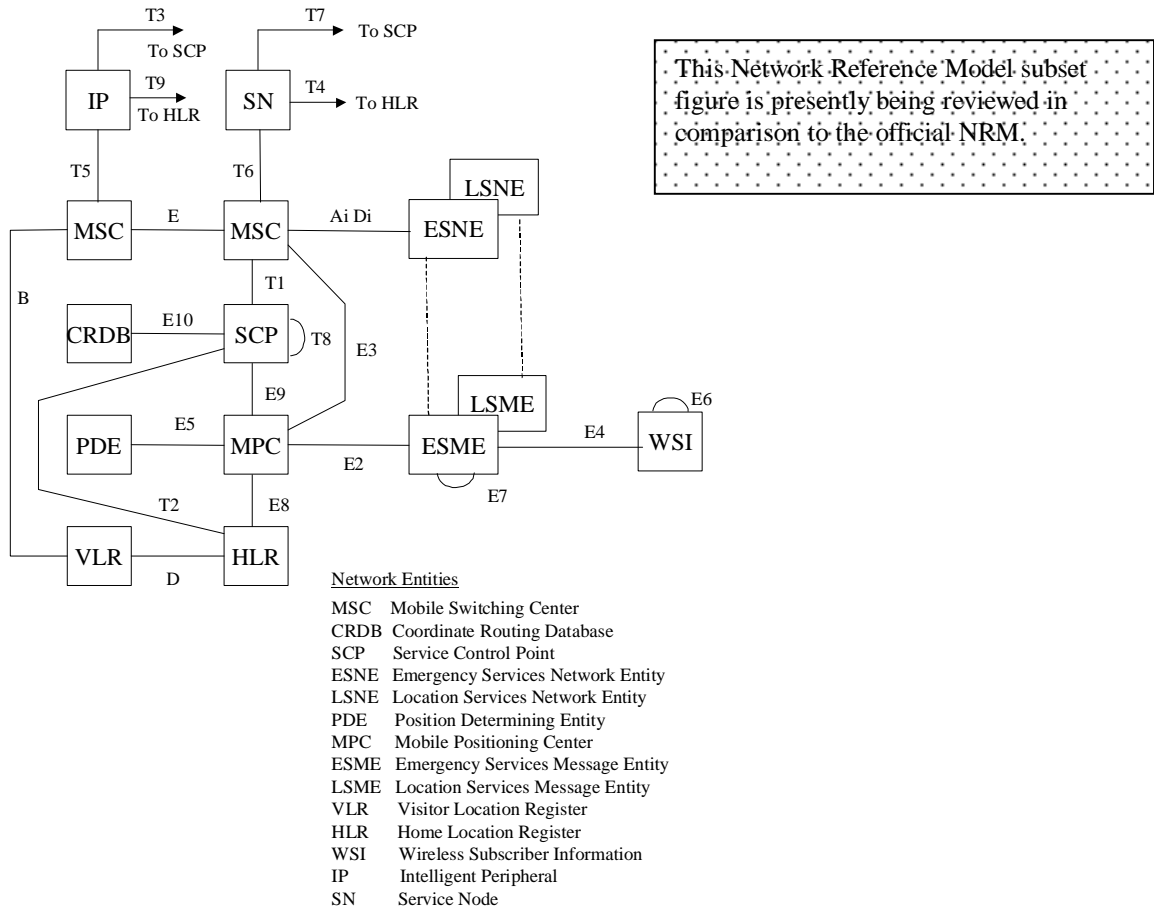


Figure 3.1

The LSME could be the application that runs a Fleet Management or Information service, or it could be the wireless network operator’s Network Management center. The LSME generally has the same functionality as the ESME, despite the fact that they individually support different types of applications.

## **S.R0019 v1.0.0 Location-Based Services System Stage 1 Description**

1           In addition, the LSNE routes and processes the voice band portion of those calls that are subjected to location-  
2           based routing. As an example, the LSNE could be the call center for a Concierge service or for a Roadside  
3           Assistance service provider. The LSNE generally has the same functionality as the ESNE despite the fact that they  
4           both support different types of calls.

5  
6           A standard interface between the LSME and the LSNE is not required.

7  
8           A standardized E5 interface is required.

9  
10          The protocols defined for LBSS shall be compatible with other protocols used within the NRM.

11  
12

1 **4.0 Location Services Support System**  
2

3 **4.1 General Description**  
4

5 This section describes drivers for location-based services that will likely be developed by network operators. These  
6 service drivers should be used as guidelines to develop a set of service-independent network capabilities.

7 The illustrated services have a common characteristic: They all require that the provider of the Location-Based  
8 services have access to the location information of the subscriber and this information is fundamental to delivery of  
9 the Location-Based services. This requires the existence in the wireless network of a location-determining  
10 capability which is described in the next section.

11 The described services will also require enhancements to the existing capabilities. Some LBSS Services will be  
12 invoked when the subscriber “powers on” the mobile station. Some LBSS depends upon the ability to detect when  
13 the mobile station has crossed a boundary between “zones”. Some LBSS depends upon the ability of service logic  
14 to determine the geographic location of a mobile station at any point in time. New operations will be required to  
15 detect these types of events and activities. “Zones” shall be defined by the service provider. Zone establishment  
16 shall be beyond the scope of the specification.  
17  
18

19 **4.2 Network Capabilities**  
20

21 In addition to the service drivers described in this section, the TSG-S subcommittee supports development of  
22 several service-independent network capabilities. See Section 5 for details.  
23

24 **4.3 Billing and Settlement Capabilities**  
25

26 Call Detail Records will need to be modified so as to record the new types of information associated with LBSS.  
27 Specifically, the CTIA WIN Subtask Group recommended that TIA make appropriate enhancements to ANSI-124  
28 to support LBSS. The TSG-S subcommittee supports this recommendation.  
29

30 Refer to the specific service driver descriptions for examples of the types of Call Detail Record to be collected.  
31  
32

1 **4.4 Location Services Specific Requirements**

2  
3 **4.4.1 Location-Based Charging**

4  
5 **4.4.1.1 Location-Based Charging Overview:**

6  
7 Location-Based Charging (LBC) is a Wireless service that provides the functionality of charging different rates  
8 based upon the location of the subscriber. The LBC service may be designed to support specialized call-origination  
9 and call-termination services based upon the subscriber's geographical location.  
10

11 **4.4.1.2 Location-Based Charging: Stage 1 Description**

12  
13 Location-Based Charging (LBC) permits a wireless subscriber to be charged different rates for  
14 telecommunications services based upon location or geographical area. Different rates may be charged based upon  
15 location or changes in location. Different rates may be charged for the duration of the call or any part thereof. LBC  
16 may be made available to individual subscribers or to groups of subscribers based upon logical associations or  
17 locations.  
18

19 ***Location Services for Individual Subscribers***

20  
21 LBC can be a service for an individual subscriber. As such, LBC presents the opportunity to individually define  
22 and to benefit from geographical areas or zones that have been custom-designed for that particular subscriber's  
23 daily route and life-style. These geographical areas could be designed to maximize benefit from the LBC service by  
24 providing lower rates for usage in a subscriber's most frequently visited areas. Examples could be a home zone or  
25 an office zone. The LBC service could provide yet another rate for usage in shopping malls or golf courses or  
26 country clubs. LBC services might also offer different rates for usage based upon time-of-day or day-of-week in the  
27 zones that they have defined.  
28

29 The specification shall support optional notification to subscribers in which zone or billing tier they are currently  
30 operating. The specification shall also support optional notification of changes in zone or billing tier as the  
31 subscriber changes location boundaries.  
32

33 ***Location Services for Commercial Business Groups***

34  
35 LBC can provide services for commercial business groups as well as for individual subscribers. LBC service  
36 applications might include corporate campus services, work zones or business zones that offer multiple tier billing  
37 rates for groups of commercial users. LBC commercial business services might include implementations that  
38 include Freephone (FPH), Premium Rate Charging (PRC) and other complex, specialized services that are based  
39 on location of the user. Virtual national campus zones might also be considered to be part of a commercial LBC  
40 application by leveraging WIN and other technologies, along with location information, to support a multiple-  
41 location virtual national campus. The specification shall support optional notification to commercial users in which  
42 zone or billing tier they are currently operating.  
43

44 **Applicability to Telecommunications Services**

45 LBC is applicable to all telecommunications services.  
46

47 **Normal Procedures With Successful Outcome**

48  
49 **Authorization**

50 LBC is provided after pre-arrangement with service provider

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**De-Authorization**

LBC may be withdrawn at the subscriber's request, the business customer's request or for administrative reasons.

**Registration**

LBC has no registration.

**De-Registration**

LBC has no de-registration.

**Activation**

LBC can be activated using special feature codes on a subscriber or business customer basis.

**De-Activation**

LBC can be de-activated using special feature codes on a subscriber or business customer basis.

**Invocation**

LBC may be invoked by initial mobile station registration, autonomous registration, or by calls placed or received by the mobile station.

**Normal Operation with Successful Outcome**

Under normal operating procedures LBC may be invoked upon initial registration. LBC would analyze location information to determine the location and establish the current zone of the subscriber. LBC would notify the subscriber of their current zone. As the subscriber changes zones the subscriber may be notified of changes to their zone and the rate may be changed. Except for subscriber notification, LBC should function transparently to the subscriber and independent of voice calls, SMS, data or other services being delivered to the subscriber.

**Call Detail Record**

For all invocations LBC and Call Detail Records (CDRs) must record information so that multiple tier billing for LBC services can be achieved. Description of recommended call detail information to record LBC usage follows. The system should record billing information and may include (depending on usage) the following non-exhaustive elements:

1. Location information
2. Zone information (e.g., zone identification, zone boundary crossings)
3. Type of event
4. Time of event
5. Duration of event
6. Feature usage during event
7. DMH Parameters including DMH\_ServiceID
8. Subscriber identification
9. Normal CDR information

See *ANSI-124* for the specific information to be included for each element.

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**Exception Procedures or Unsuccessful Outcome**

**Registration**

None identified.

**De-Registration**

None identified.

**Activation**

None identified.

**De-Activation**

None identified.

**Invocation**

None identified.

**Exceptions While Roaming**

If a mobile station with LBC active roams into a system that does not support the LBC location service, the following services may be available to the subscriber:

1. Call to customer service
2. Provide subscriber or business user notification of the out of coverage situation using best possible method. (MS Display, SMS, etc.)

**Exceptions During Intersystem Handoff**

None identified.

**Alternative Procedures**

If the LBC subscriber has “blocked” their location information, the network shall not provide the mobile station location information to any service logic application unless specifically authorized to do so. In such cases, the location information would not be available to the LBC service logic, and alternative procedures shall be applied (e.g., call denial, connection to customer service). See Section 5.3 of this SRD for additional description of the authentication and privacy capabilities.

**Interactions With Other Wireless Services**

**Asynchronous Data Service (ADS)**

None identified.

**Call Delivery (CD)**

LBC is invoked before CD

**Call Forwarding—Busy (CFB)**

LBC is invoked before CFB

**Call Forwarding—Default (CFD)**

LBC is invoked before CFD

**Call Forwarding—No Answer (CFNA)**

LBC is invoked before CFNA

## S.R0019 v1.0.0 Location-Based Services System Stage 1 Description

- 1        **Call Forwarding—Unconditional (CFU)**
- 2        LBC is invoked before CFU
- 3
- 4        **Call Transfer (CT)**
- 5        LBC is invoked before CT
- 6
- 7        **Call Waiting (CW)**
- 8        LBC is invoked before CW
- 9
- 10       **Calling Name Presentation (CNAP)**
- 11       LBC is invoked before CNAP
- 12
- 13       **Calling Number Identification Presentation (CNIP)**
- 14       LBC is invoked before CNIP
- 15
- 16       **Calling Number Identification Restriction (CNIR)**
- 17       None identified
- 18
- 19       **Conference Calling (CC)**
- 20       LBC is invoked before CC
- 21
- 22       **Data Privacy (DP)**
- 23       For Further Study
- 24
- 25       **Do Not Disturb (DND)**
- 26       LBC is invoked before DND
- 27
- 28       **Emergency Services (9-1-1)**
- 29       Emergency services is invoked before LBC
- 30
- 31       **Flexible Alerting (FA)**
- 32       LBC is invoked before FA
- 33
- 34       **Group 3 Facsimile Service (G3 Fax)**
- 35       Not applicable
- 36
- 37       **Incoming Call Screening (ICS)**
- 38       LBC is invoked before ICS
- 39
- 40       **Message Waiting Notification (MWN)**
- 41       LBC is invoked before MWN
- 42
- 43       **Mobile Access Hunting (MAH)**
- 44       Interaction between LBC and MAH is beyond the scope of this specification
- 45
- 46       **Network Directed System Selection (NDDSS)**
- 47       LBC is invoked before NDDSS
- 48
- 49       **Non-Public Mode Service (NP)**
- 50       LBC is invoked before NP
- 51
- 52       **Over-the-Air Activation (OTA)**
- 53       For Further Study

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**Password Call Acceptance (PCA)**

LBC is invoked before PCA

**Preferred Language (PL)**

LBC is invoked before PL

**Priority Access and Channel Assignment (PACA)**

LBC is invoked before PACA

**Remote Feature Control (RFC)**

LBC is invoked before RFC

**Selective Call Acceptance (SCA)**

LBC is invoked before SCA

**Speech Option Selection (SOS)**

LBC is invoked before SOS

**Speech-to-Text Conversion (STC)**

For Further Study

**Subscriber PIN Access (SPINA)**

For Further Study

**Subscriber PIN Intercept (SPINI)**

For Further Study

**Three-Way Calling (3WC)**

LBC is invoked before 3WC

**User Group ID (UGID)**

LBC is invoked before UGID

**Voice Controlled Dialing (VCD)**

LBC is invoked before VCD

**Voice Controlled Feature Control (VCFC)**

LBC is invoked before VCFC

**Voice Message Retrieval (VMR)**

LBC is invoked before VMR

**Voice Privacy (VP)**

For Further Study

**Voice-based User Identification (VUI)**

For Further Study

1 **4.4.2 Fleet and Asset Management Service**

2

3 **4.4.2.1 Fleet and Asset Management Service: Overview**

4

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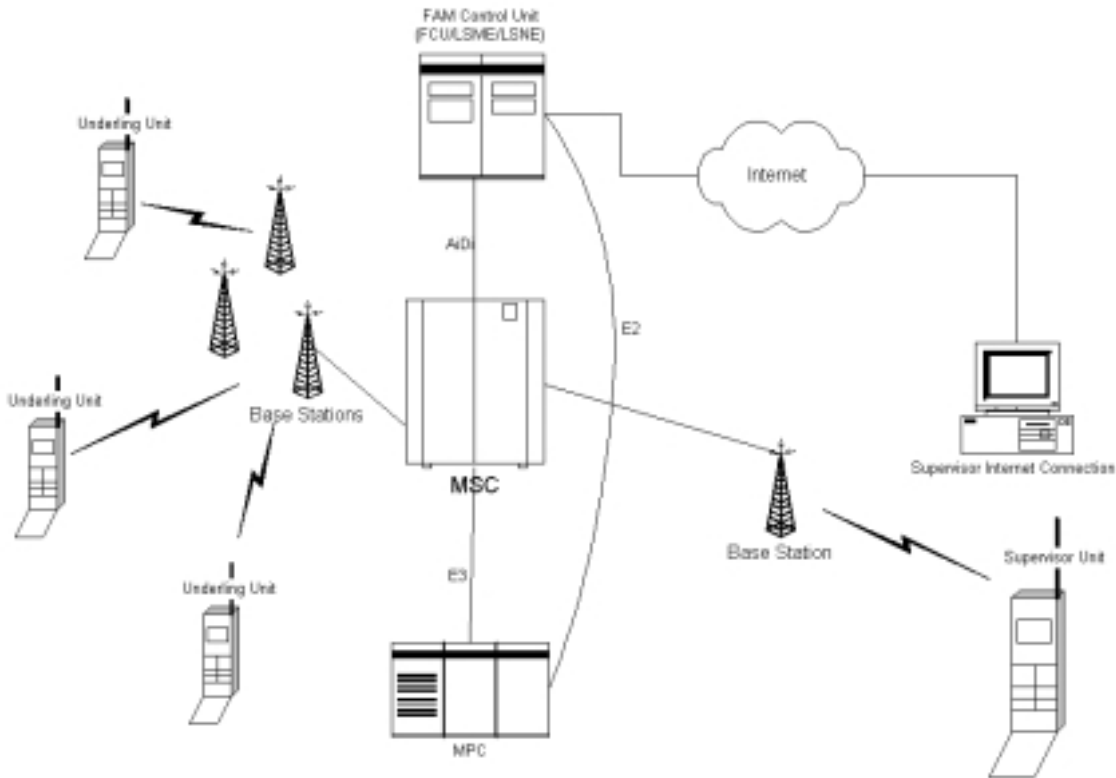
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Fleet and Asset Management (FAM) Service allows a supervisor to track the location and status of his/her subordinates, and allows the subordinates to use feature codes to communicate status information back to the supervisor. The supervisor may also have the ability to relay messages (e.g. phone calls, voice mail, SMS) to his/her subordinates.



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Figure 4.1

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The figure illustrates the FAM service overview. Note, that in the above diagram, the connection from the FCU to the Internet is out of the scope of this SRD. It is included as an example to illustrate a potential method that a service provider could utilize to implement the FAM service.

The FAM Control Unit (FCU) would hold the location and status of the units. Any pending messages would be delivered to the appropriate units.

The FAM supervisor is the person who operates the Supervisor unit. He/she could gain access to the FAM Control Unit via internet connection or through the Supervisor unit. When he/she connects to the FCU from the Supervisor unit, he/she may be interfaced with a Web page technology (for data interface) or an IVR (for voice).

## **S.R0019 v1.0.0 Location-Based Services System Stage 1 Description**

- 1           The FAM underling is a device which operates under the FAM supervisor and which is co-located or attached to
- 2           the fleet object or asset.
- 3
- 4

**4.4.2.2 Fleet and Asset Management Service: Stage 1 Description**

Fleet and Asset Management (FAM) service allows for Fleet and Asset Tracking, and Management using call-associated and non-call-associated Location-Based Services. Examples may include a supervisor of a delivery service who needs to know the location and status of his/her employees, parents who need to know where their children are, or even to locate inanimate objects such as vending machines that a company may wish to track.

FAM service is differentiated between the supervisor/leader/owner of the fleet/assets in charge of tracking and management (FAM supervisor) and the other fleet members or assets being tracked (FAM subordinates). A FAM supervisor may also concurrently be considered a FAM subordinate; and, if so, his/her unit may also be capable of the same functionality as the other subordinates' units. There may also be more than one FAM supervisor.

Thus, a supervisor should be capable of tracking all active subordinates and him/herself also, in case the supervisor wishes to act as an subordinate as well. (i.e. owner of a delivery company is also a deliverer)

The FAM units are wireless handsets or similar devices that are provided to all subordinates to be tracked, and these handsets allow specialized functionality; and, to the supervisor (even if s/he is not to be tracked also), to allow underling tracking and other specialized functionality. The FAM supervisor may have a more specialized wireless device than the subordinates (e.g. Web browser), but it need not be a requirement, and lack thereof should not affect specialized supervisor functions. Unit hardware is not intended to differentiate between supervisor and underling.

FAM services can be originated by the FAM supervisor, FAM subordinate or both, depending upon the service functionality.

A FAM supervisor would be able to access one or several of his/her subordinates' location and status information through an appropriate interface (i.e. Internet or IVR). Information available to the supervisor would include the real-time location of one or of several units that are registered. In case the unit is not registered (i.e. inactive or outside coverage), the best available location information may be provided. This information may include, if possible, the time it was acquired and the reason why immediate location data is not available. A FAM supervisor may also be able to relay messages (messages include phone calls, voice mail, or SMS) to the units through the appropriate interface, as well as to receive messages originated by these units.

FAM subordinate may also have access to only his/her own approximate location information upon request through the unit display or voice instructions. The subordinate may also be able to use feature codes to communicate repetitive or urgent status information (i.e. "arrived", "cleared", "enroute", "trouble", etc.) to the supervisor or to other authorities in addition to SMS messages. Optionally (to the supervisor's discretion), any FAM underling may be capable of message generation and of delivery to any other unit, irrespective of status (supervisor or underling).

FAM subordinate could also access voice and other internet content services.

For a "data-only" underling unit, it may also be desirable to introduce a "panic button" to notify the FAM supervisor and/or appropriate authorities in case of emergency. Use of this "panic button" may relay a preset SMS message and unit location information at the time of "panic button" use.

FAM Control Unit (FCU) may provide position data to the FAM supervisor upon demand, and/or as location updates are received (when underling crosses a certain zone), and/or on a periodic basis.

Charging for FAM services may be accomplished through a flat-rate or per-usage or a combination of both.

FAM may request authorization permission and may respect user privacy.

## S.R0019 v1.0.0 Location-Based Services System Stage 1 Description

### Applicability to Telecommunications Services

FAM is applicable to all telecommunications services.

### Normal Procedures With Successful Outcome

#### Authorization

FAM is provided after pre-arrangement with service provider

#### De-Authorization

FAM may be withdrawn at the subscriber's request or for administrative reasons.

#### Registration

FAM has no registration.

#### De-Registration

FAM has no de-registration.

#### Activation

Previously established profiles are activated upon activation

#### **FAM Supervisor Activation**

The FAM Supervisor may be able to activate FAM service for all or certain FAM units by either:

- a) Upon signing up the FAM service with the FAM service provide
- b) Placing an activation request on the appropriate FAM interface (i.e. internet or IVR) for the unit(s) to be activated, or
- c) By means of entering the appropriate feature code and the MIN of the unit to be activated.

\*FC + MIN +

Or

this process will be repeated to activate all desired units.

- d) By means of entering the appropriate feature code and the group MIN (contains a number of preprogrammed supervisor and underling units) to be activated.

\*FC + group MIN +

Successful activation may be confirmed with appropriate feature treatment.

Note: FAM units carry their own individual MINs (and MDNs in case WNP is applicable) as any other wireless handset. Appropriate grouping of these MINs for purposes of billing, identification by the system, and any other implementation details is left to the Wireless Service Provider's discretion.

#### **FAM Subordinate Activation**

A FAM subordinate (that is not also a supervisor) may optionally also be allowed to activate only his/her unit if it has not yet been activated by the FAM supervisor by means of entering the appropriate feature code and the unit's MIN, as in:

\*FC + MIN +

or

1  
2  
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32  
33  
34  
35  
36  
37

\*FC +

Successful activation may be confirmed with appropriate feature treatment.  
In case the supervisor has already activated the unit in question, the underling may be notified of this status when attempting self-activation through the use of the feature code.

**FAM Activation Restriction**

FAM subscribers may set up an activation restriction scheme so that, if requested, only the FAM supervisor performs all activations.

**De-Activation**

**FAM Supervisor De-Activation**

The FAM Supervisor may be able to de-activate FAM service for all or certain FAM units through the appropriate interface by either:

- a) Contacting FAM service provide customer service line
- b) Placing a de-activation request on the appropriate FAM interface (i.e. internet or IVR) for the unit(s) to be de-activated, or
- c) By means of entering the appropriate feature code and the MIN of the unit to be de-activated.

\*FC0 + MIN +

Or

This process will be repeated to de-activate all desired units.

- d) By means of entering the appropriate feature code and the group MIN (contains a number of preprogrammed supervisor and underling units) to be de-activated.

\*FC + group MIN +

Successful de-activation may be confirmed with appropriate feature treatment.

Note: FAM units carry their own individual MINs (and MDNs in case WNP is applicable) as any other wireless handset. Appropriate grouping of these MINs for purposes of billing, identification by the system, and any other implementation details is left to the Wireless Service Provider's discretion.

1           **FAM Unit De-Activation**

2           A FAM underling (that is not also a supervisor) may optionally also be allowed to de-activate his/her unit  
3           by means of entering the appropriate feature code and the unit's MIN, as in:

4                           \*FC0 + MIN +

5  
6                           or

7  
8                           \*FC0 +

9  
10          Successful de-activation may be confirmed with appropriate feature treatment.

11  
12          **FAM De-Activation Restriction**

13          FAM subscribers may set up a de-activation restriction scheme so that, if requested, only the FAM  
14          supervisor performs all de-activations. If FAM de-activation is restricted, FAM unit de-activation will  
15          become unavailable to the FAM underlings.

16  
17          **Invocation**

18          FAM is invoked when an event occurs. An event may include: FAM supervisor and/or underling location  
19          requests or updates, FAM supervisor and/or underling SMS message origination and termination, and  
20          FAM supervisor and/or unit voice calls.

21  
22          **Normal Operation with Successful Outcome**

23  
24          **FAM Supervisor Operations**

25          The FAM supervisor may access an appropriate interface (i.e. FAM Web browser handset, Internet, or  
26          IVR). After supplying proper identification, s/he may access any pending SMS or voice messages  
27          originated by the FAM units.

28  
29          The interface should also allow the FAM supervisor access to on demand location requests, whereupon one  
30          or a number of FAM unit identifications may be entered. As soon as it is available, the interface should  
31          securely return in an acceptable format the approximate geographical location of the unit(s) requested.  
32          The supervisor may automatically receive periodic location updates and unit originated location updates  
33          through that same appropriate interface.

34  
35          If the interface allows, the supervisor may write SMS messages to be delivered to a specific unit or units.

36  
37          FAM units can be registered idle or registered busy when supplying location information to the network for  
38          delivery to the FAM supervisor.

39  
40          The FAM supervisor may be able to place voice calls to units at any time.

41  
42          **FAM Subordinate Operations**

43          The FAM underling may be able to contact the FAM supervisor through voice or SMS messages, which  
44          s/he will receive as described above. The operations for sending these messages should be similar to  
45          previously described voice and SMS message deliveries. For common messages, underlings may be able to  
46          simply punch in a feature code representing that common message in addition to initiating an SMS  
47          message. Optionally, the underling may also be able to contact other field units or outside terminations.

48  
49          FAM units must be registered idle prior to performing their origination operations.

50  
51          FAM unit requests for self-location fall under the Information Services description.

1           **Call Detail Record**  
2           Description of recommended call detail information to record the use of the feature. This may include  
3           (dependent on the feature) the following non-exhaustive elements:

- 4           1. Feature invocation activities
  - 5           2. Feature usage duration
  - 6           3. Call leg usage
- 7           See *IS-124* for the specific information to be included for each element.

8  
9           **Exception Procedures or Unsuccessful Outcome**

10  
11          **Registration**  
12          None identified.

13  
14          **De-Registration**  
15          None identified.

16  
17          **Activation**  
18          None identified.

19  
20          **De-Activation**  
21          None identified.

22  
23          **Invocation**  
24          None identified.

25  
26          **Exceptions While Roaming**  
27          If a unit with FAM active roams into a system that does not support FAM location service, the following  
28          services may be available to the subscriber:  
29          1. Call to FAM Customer Support or to FAM supervisor.  
30          2. FAM unit receives SMS message informing the unit user (underling or supervisor) that FAM location  
31          service is unavailable. The best estimate (serving network or the last location identified ) would be  
32          provided to the FCU.  
33          3. FAM supervisor receives SMS message informing that for a certain underling unit FAM location  
34          service is unavailable. The best estimate (serving network or the last location identified) would be  
35          provided to the FCU.

36  
37  
38          **Exceptions During Intersystem Handoff**  
39          None identified.

40  
41

1           **Alternative Procedures**

2           In case the FCU providing the internet interface to the subscriber is down, the subscriber/fleet/asset  
3           supervisor may be contacted and requested to use the FAM Customer Support line or IVR while the  
4           problem is being resolved.

5  
6           *Add/Delete New Underling*

7           Initially, FAM units may be placed in the FAM Supervisor's fleet upon signing up the FAM service with  
8           the FAM service provider. The FAM Supervisor may add or delete a new underling to his/her fleet  
9           through the same mechanism by which other tracking services are performed (e.g. Internet or IVR), by  
10          simply entering the MIN of the underling to be added or deleted.

11  
12          *FAM Privacy*

13          There may be some concern that an unauthorized Supervisor could try to track the location of a mobile  
14          user, thus constituting an invasion of privacy. To ensure privacy, after the Supervisor has added an  
15          underling, the owner of the handset to be added must somehow confirm participation in the fleet. A  
16          possible scenario for this could have the FCU automatically calling the underling to request confirmation of  
17          acceptance to the fleet. The particular method of confirmation may vary depending on the nature of the  
18          FAM underling. (e.g. mobile phones may require confirmation from the user as described above, whereas  
19          FAM units specifically designed for asset tracking may not even have a user interface, and thus could be  
20          added to a group by simply having the supervisor enter a confirmation code.)

21  
22  
23          **Interactions With Other Wireless Services**

24  
25          **Asynchronous Data Service (ADS)**

26          None identified.

27  
28          **Call Delivery (CD)**

29          None identified

30  
31          **Call Forwarding—Busy (CFB)**

32          None identified

33  
34          **Call Forwarding—Default (CFD)**

35          None identified

36  
37          **Call Forwarding—No Answer (CFNA)**

38          None identified

39  
40          **Call Forwarding—Unconditional (CFU)**

41          None identified

42  
43          **Call Transfer (CT)**

44          None identified

45  
46          **Call Waiting (CW)**

47          None identified

48  
49          **Calling Name Presentation (CNAP)**

50          None identified

51  
52          **Calling Number Identification Presentation (CNIP)**

53          None identified

|    |   |
|----|---|
| 1  |   |
| 2  | <b><u>Calling Number Identification Restriction (CNIR)</u></b>            |
| 3  | None identified   |
| 4  |   |
| 5  | <b><u>Conference Calling (CC)</u></b>                                     |
| 6  | None identified   |
| 7  |   |
| 8  | <b><u>Data Privacy (DP)</u></b>   |
| 9  | For Further Study   |
| 10 |   |
| 11 | <b><u>Do Not Disturb (DND)</u></b>  |
| 12 | None identified   |
| 13 |   |
| 14 | <b><u>Emergency Services (9-1-1)</u></b>                                  |
| 15 | Emergency services take precedence over FAM                               |
| 16 |   |
| 17 | <b><u>Flexible Alerting (FA)</u></b>                                      |
| 18 | None identified   |
| 19 |   |
| 20 | <b><u>Group 3 Facsimile Service (G3 Fax)</u></b>                          |
| 21 | Not applicable  |
| 22 |   |
| 23 | <b><u>Incoming Call Screening (ICS)</u></b>                               |
| 24 | None identified   |
| 25 |   |
| 26 | <b><u>Message Waiting Notification (MWN)</u></b>                          |
| 27 | None identified   |
| 28 |   |
| 29 | <b><u>Mobile Access Hunting (MAH)</u></b>                                 |
| 30 | Interaction between FAM and MAH is beyond the scope of this specification |
| 31 |   |
| 32 | <b><u>Network Directed System Selection (NDSS)</u></b>                    |
| 33 | None identified   |
| 34 |   |
| 35 | <b><u>Non-Public Mode Service (NP)</u></b>                                |
| 36 | None identified   |
| 37 |   |
| 38 | <b><u>Over-the-Air Activation (OTA)</u></b>                               |
| 39 | For Further Study   |
| 40 |   |
| 41 | <b><u>Password Call Acceptance (PCA)</u></b>                              |
| 42 | None identified   |
| 43 |   |
| 44 | <b><u>Preferred Language (PL)</u></b>                                     |
| 45 | None identified   |
| 46 |   |
| 47 | <b><u>Priority Access and Channel Assignment (PACA)</u></b>               |
| 48 | None identified   |
| 49 |   |
| 50 | <b><u>Remote Feature Control (RFC)</u></b>                                |
| 51 | None identified   |
| 52 |   |

- 1        **Selective Call Acceptance (SCA)**
- 2        None identified
- 3
- 4        **Speech Option Selection (SOS)**
- 5        None identified
- 6
- 7        **Speech-to-Text Conversion (STC)**
- 8        For Further Study
- 9
- 10       **Subscriber PIN Access (SPINA)**
- 11       For Further Study
- 12
- 13       **Subscriber PIN Intercept (SPINI)**
- 14       For Further Study
- 15
- 16       **Three-Way Calling (3WC)**
- 17       None identified
- 18
- 19       **User Group ID (UGID)**
- 20       None identified
- 21
- 22       **Voice Controlled Dialing (VCD)**
- 23       None identified
- 24
- 25       **Voice Controlled Feature Control (VCFC)**
- 26       None identified
- 27
- 28       **Voice Message Retrieval (VMR)**
- 29       None identified
- 30
- 31       **Voice Privacy (VP)**
- 32       For Further Study
- 33
- 34       **Voice-based User Identification (VUI)**
- 35       For Further Study
- 36
- 37
- 38
- 39
- 40
- 41
- 42

1 **4.4.3 Location-Based Call Routing Service**

2  
3 **4.4.3.1 Location-Based Call Routing Service: Stage 1 Description**

4  
5 Enhanced Call Routing (ECR) allows calls to be routed to the appropriate geographic destination based  
6 upon the location/position of the mobile. For example, if the user dials # 427 (i.e., # GAS) the call will be  
7 routed to the nearest gas station. Another form of ECR causes the call to connect via the least expensive  
8 route, sends the call to a toll free 800 number or routes the call to the nearest private network node for a  
9 large customer, all based upon customer location.

10 As an option, the call may be air-time-free to the caller, and the “owner” of the number may be charged for  
11 the air time.

12  
13 **Applicability to Telecommunications Services**

14 ECR is applicable to all telecommunications services.

15  
16 **Normal Procedures With Successful Outcome**

17  
18 **Authorization**

19 ECR may be generally available or after pre-arrangement with the service provider.

20  
21 **De-Authorization**

22 ECR may be withdrawn at the subscriber’s request or for administrative reasons.

23  
24 **Registration**

25 ECR has no registration.

26  
27 **De-Registration**

28 ECR has no de-registration.

29  
30 **Activation**

31 ECR has no activation.

32  
33 **De-Activation**

34 ECR has no de-activation.

35  
36 **Invocation**

37  
38 For initiation of ECR from the mobile station, the user enters the “#” abbreviated dialing code, followed by  
39 supplementary digits (e.g., any number of digits to be interpreted by the MSC). The following are  
40 examples.

41  
42 # + XX + SEND

43  
44 Where XX indicates any number of supplementary digits that represents an abbreviated dialing  
45 string.

46  
47 Or

48  
49 # + DN + SEND

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1           Where DN indicates a Directory Number (NPA-NXX-XXXX).  
2

3           Or  
4

5           # + ZZ + DN + SEND  
6

7           Where ZZ indicates supplementary digits followed by a DN (Directory Number).  
8

### 9           Normal Operation with Successful Outcome

10          This section describes a normal sequence of procedures for ECR operation.  
11

- 12
- 13          1. A subscriber dials the abbreviated dialing sequence such as # + XXX or # + DN.
- 14          2. The network routes the call to the appropriate geographic destination, based upon the location/position  
15             of the mobile and the dialed digits. For example, if the customer dials # 427 (i.e., # GAS), the call will  
16             be routed to the nearest gas station. Or if the customer dials # + DN, the call will be routed to the  
17             nearest network node for the customer.  
18

### 19          Call Detail Record

20          The call detail record shall record the following items:

- 21          • Identity of the calling party.
- 22          • Identity of the called number.
- 23          • Location/position of the mobile.
- 24          • Call duration and times.
- 25          • Identity of the party that should be billed for the call (for ECR).  
26

### 27          Exception Procedures or Unsuccessful Outcome

28          This section lists some of the more probable abnormal situations not described in *Normal Procedures With*  
29          *Successful Outcome*.  
30

### 31          Registration

32          None identified.  
33

### 34          De-Registration

35          None identified.  
36

### 37          Activation

38          None identified.  
39

### 40          De-Activation

41          None identified.  
42

### 43          Invocation

44          A typical problem during ECR invocation is that the network may not have the location/position of the  
45          mobile at the time of call setup. In this case, exception procedures shall be defined locally.  
46

### 47          Exceptions While Roaming

48          None identified.  
49

1        **Exceptions During Intersystem Handoff**

2        None identified.

3  
4        **Alternative Procedures**

5        At the option of the serving carrier, originating ECR calls may be reverse-billed to the owner of the ECR  
6        number.

7  
8        If the ECR subscriber has “blocked” his/her location information, the network shall not provide the mobile  
9        station location information to any service logic application unless specifically authorized to do so. In such  
10       cases, the location information would not be available to the ECR service logic, and alternative procedures  
11       shall be applied. See Section 5.3 of this SRD for additional description of the authentication and privacy  
12       capabilities.

13  
14  
15       **Interactions With Other Wireless Services**

16  
17       **Asynchronous Data Service (ADS)**

18       None identified.

19  
20       **Call Delivery (CD)**

21       None identified.

22  
23       **Call Forwarding—Busy (CFB)**

24       None identified.

25  
26       **Call Forwarding—Default (CFD)**

27       None identified.

28  
29       **Call Forwarding—No Answer (CFNA)**

30       None identified.

31  
32       **Call Forwarding—Unconditional (CFU)**

33       None identified.

34  
35       **Call Transfer (CT)**

36       None identified.

37  
38       **Call Waiting (CW)**

39       None identified.

40  
41       **Calling Name Presentation (CNAP)**

42       None identified.

43  
44       **Calling Number Identification Presentation (CNIP)**

45       None identified.

46  
47       **Calling Number Identification Restriction (CNIR)**

48       None identified.

49  
50       **Conference Calling (CC)**

51       ECR destinations may be part of Conference Calling.

- 1        **Data Privacy (DP)**
- 2        None identified.
- 3
- 4        **Do Not Disturb (DND)**
- 5        None identified.
- 6
- 7        **Emergency Services (9-1-1)**
- 8        Emergency Services takes precedence over ECR.
- 9
- 10       **Emergency Services Callback (9-1-1CB)**
- 11       None identified.
- 12
- 13       **Emergency Services Reconnect (9-1-1RC)**
- 14       None identified.
- 15
- 16       **Flexible Alerting (FA)**
- 17       For further study.
- 18
- 19       **Group 3 Facsimile Service (G3 Fax)**
- 20       None identified.
- 21
- 22       **Incoming Call Screening (ICS)**
- 23       None identified.
- 24
- 25       **Message Waiting Notification (MWN)**
- 26       None identified.
- 27
- 28       **Mobile Access Hunting (MAH)**
- 29       For further study.
- 30
- 31       **Network Directed System Selection (NDSS)**
- 32       None identified.
- 33
- 34       **Non-Public Mode Service (NP)**
- 35       None identified.
- 36
- 37       **Over-the-Air Activation (OTA)**
- 38       OTA is invoked before ECR.
- 39
- 40       **Password Call Acceptance (PCA)**
- 41       None identified.
- 42
- 43       **Preferred Language (PL)**
- 44       None identified.
- 45
- 46       **Priority Access and Channel Assignment (PACA)**
- 47       None identified.
- 48
- 49       **Remote Feature Control (RFC)**
- 50       None identified.
- 51
- 52       **Selective Call Acceptance (SCA)**
- 53       None identified.

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42  
43

**Speech Option Selection (SOS)**

None identified.

**Speech-to-Text Conversion (STC)**

None identified.

**Subscriber PIN Access (SPINA)**

SPINA is invoked before ECR.

**Subscriber PIN Intercept (SPINI)**

SPINI is invoked before ECR

**Three-Way Calling (3WC)**

An ECR destination may be used as part of Three-Way Calling.

**User Group ID (UGID)**

None identified.

**Voice Controlled Dialing (VCD)**

None identified.

**Voice Controlled Feature Control (VCFC)**

None identified.

**Voice Message Retrieval (VMR)**

None identified.

**Voice Privacy (VP)**

None identified.

**Voice-based User Identification (VUI)**

None identified.

1 **4.4.4 Location-Based Information Service**

2  
3 **4.4.4.1 Location-Based Information Service: Stage 1 Description**

4  
5 Location-Based Information Service (LBIS) allows subscribers to access information services for which the  
6 information content is tailored to the current location of the subscriber.

7 Examples of information services which may be location-based include:

- 8
- 9 • Wireless network operator customer service
  - 10 • Concierge (hotel and restaurant finder) service
  - 11 • Travel and tourism information service
  - 12 • Automobile association roadside assistance service
  - 13 • Directory Assistance (local yellow pages)
  - 14 • Self-location (“Where am I ?”) service
  - 15 • Traffic information service (information tailored to the specific subscriber, e.g. “turn left at Main  
16 Street”)

17 The information may be delivered to the subscriber through various means, such as:

- 18
- 19 • Announcement
  - 20 • Interactive Voice Response system
  - 21 • Graphical display (map, floor plan, picture, image)
  - 22 • Text message
  - 23 • Call set-up to an operator

24 LBIS may be invoked either:

- 25
- 26 1. Manually, by the subscriber originating a call to a Directory Number associated with the specific  
27 location-based information service; or
  - 28 2. Automatically, by the network upon detection of a trigger (such as the “power on” trigger or “zone  
29 change” trigger); or
  - 30 3. Periodically, as determined by service logic.

31  
32 **Applicability to Telecommunications Services**

33 LBIS is applicable to all telecommunications services.

34  
35 **Normal Procedures With Successful Outcome**

36  
37 **Authorization**

38 LBIS may be made generally available for all subscribers by the service provider or after pre-arrangement  
39 with the service provider.

40  
41 LBIS may be authorized for the following options:

1

*Table 1: LBIS Subscription Options*

| Subscription Options | Values  |
|----------------------|---|
| Manual Invocation    | Subscribed. The subscriber is authorized to invoke LBIS by dialing an appropriate Directory Number. |
|                      | Not subscribed.   |
| Activation           | Permanent. LBIS is active while authorized.   |
|                      | Demand. The subscriber is authorized to control the activation and de-activation of LBIS.           |

2

3

**De-Authorization**

LBIS may be withdrawn at the subscriber’s request or for administrative reasons.

4

5

6

**Registration**

LBIS has no registration.

7

8

9

**De-Registration**

LBIS has no de-registration.

10

11

12

**Activation**

LBIS may be activated upon authorization.

13

14

LBIS may be activated by a Demand Activation authorized subscriber specifying a LBIS activation feature code, as in:

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\* FC + SEND .

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If the activation is accepted, the system shall indicate success with feature confirmation treatment.

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**De-Activation**

LBIS shall be de-activated upon de-authorization.

**LBIS Demand De-Activation**

LBIS may be de-activated by a Demand Activation authorized subscriber specifying a LBIS de-activation feature code, as in:

\* FC0 + SEND .

If the de-activation is accepted, the system shall indicate success with feature confirmation treatment.

**Invocation**

LBIS may be invoked upon authorization.

**Manual Invocation**

LBIS may be invoked by a Manual-Invocation-authorized subscriber originating a call to a Directory Number for which LBIS is active, as in:

DN + SEND .

**Normal Operation with Successful Outcome**

This section describes a normal sequence of procedures for LBIS operation.

**Manual Invocation**

- Subscriber invokes the information service by originating a call to a directory number associated with that service.
- The subscriber is connected to the service provider.
- The service provider tailors the information content as per the current MS location and provides the information to the subscriber in the context of the call.

**Automatic Invocation**

- Subscriber powers on the mobile station, invoking the information service.
- The service provider tailors the information content as per the current MS location and provides the information to the subscriber.
- The information is provided to the subscriber in the form of text or map information.

**Call Detail Record**

The call detail record shall record the following items:

- Identity of the calling party.
- Identity of the called number.
- Call duration and times.
- Application or Service Identifier.

**Exception Procedures or Unsuccessful Outcome**

**Registration**

None identified.

1           **De-Registration**

2           None identified.

3

4           **Activation**

5           None identified.

6

7           **De-Activation**

8           None identified.

9

10          **Invocation**

11          A typical problem during LBIS invocation is that the location information may not be available to the  
12          service provider. In this case, exception procedures shall be defined by the WIN application or by service  
13          logic.

14

15          **Exceptions While Roaming**

16          None identified.

17

18          **Exceptions During Intersystem Handoff**

19          None identified.

20

21          **Alternative Procedures**

22          If the LBIS subscriber has “blocked” his/her location information, the network shall not provide the mobile  
23          station location information to any service logic application unless specifically authorized to do so. In such  
24          cases, the location information would not be available to the LBIS service logic, and alternative procedures  
25          shall be applied. See Section 5.3 of this SRD for additional description of the authentication and privacy  
26          capabilities.

27

28

29          **Interactions with Other Wireless Services**

30

31          **Asynchronous Data Services (ADS)**

32          None identified.

33

34          **Call Delivery (CD)**

35          None identified.

36

37          **Call Forwarding—Busy (CFB)**

38          None identified.

39

40          **Call Forwarding—Default (CFD)**

41          None identified.

42

43          **Call Forwarding—No Answer (CFNA)**

44          None identified.

45

46          **Call Forwarding—Unconditional (CFU)**

47          None identified.

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49          **Call Transfer (CT)**

50          None identified.

51

52          **Call Waiting (CW)**

53          None identified.

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- 2        **Calling Name Presentation (CNAP)**
- 3        None identified.
- 4
- 5        **Calling Number Identification Presentation (CNIP)**
- 6        None identified.
- 7
- 8        **Calling Number Identification Restriction (CNIR)**
- 9        None identified.
- 10
- 11       **Conference Calling (CC)**
- 12       None identified.
- 13
- 14       **Data Privacy (DP)**
- 15       None identified.
- 16
- 17       **Do Not Disturb (DND)**
- 18       None identified.
- 19
- 20       **Emergency Services (9-1-1)**
- 21       Emergency Services takes precedence over LBIS.
- 22
- 23       **Emergency Services Callback (9-1-1CB)**
- 24       None identified.
- 25
- 26       **Emergency Services Reconnect (9-1-1RC)**
- 27       None identified.
- 28
- 29       **Flexible Alerting (FA)**
- 30       For further study.
- 31
- 32       **Group 3 Facsimile Service (G3 Fax)**
- 33       None identified.
- 34
- 35       **Incoming Call Screening (ICS)**
- 36       None identified.
- 37
- 38       **Message Waiting Notification (MWN)**
- 39       None identified.
- 40
- 41       **Mobile Access Hunting (MAH)**
- 42       For further study.
- 43
- 44       **Network Directed System Selection (NDSS)**
- 45       None identified.
- 46
- 47       **Non-Public Mode Service (NP)**
- 48       None identified.
- 49
- 50       **Over-the-Air Activation (OTA)**
- 51       OTA is invoked before LBIS.
- 52

1           **Password Call Acceptance (PCA)**

2           None identified.

3

4           **Preferred Language (PL)**

5           None identified.

6

7           **Priority Access and Channel Assignment (PACA)**

8           None identified.

9

10          **Remote Feature Control (RFC)**

11          None identified.

12

13          **Selective Call Acceptance (SCA)**

14          None identified.

15

16          **Speech Option Selection (SOS)**

17          None identified.

18

19          **Speech-to-Text Conversion (STC)**

20          None identified.

21

22          **Subscriber PIN Access (SPINA)**

23          SPINA is invoked before LBIS.

24

25          **Subscriber PIN Intercept (SPINI)**

26          SPINI is invoked before LBIS

27

28          **Three-Way Calling (3WC)**

29          None identified.

30

31          **User Group ID (UGID)**

32          None identified.

33

34          **Voice Controlled Dialing (VCD)**

35          None identified.

36

37          **Voice Controlled Feature Control (VCFC)**

38          None identified.

39

40          **Voice Message Retrieval (VMR)**

41          None identified.

42

43          **Voice Privacy (VP)**

44          None identified.

45

46          **Voice-based User Identification (VUI)**

47          None identified.

48

49

5.0 Network Capabilities

The following requirements describe WIN support for several network capabilities. These network capabilities do not have service drivers. They are service-independent network capabilities.

5.1 Location Information Flows

The WIN location architecture shall support multiple modes of operation in terms of the “flow” of Location Information and commercial services provided based upon location. The information and control flows are reflected in figure 5.1 and support the following operations:

- Asynchronous Event Location Information Push
- Asynchronous Event Location Information Pull
- Synchronous Event Location Information Poll
- Synchronous Event Location Information Pull

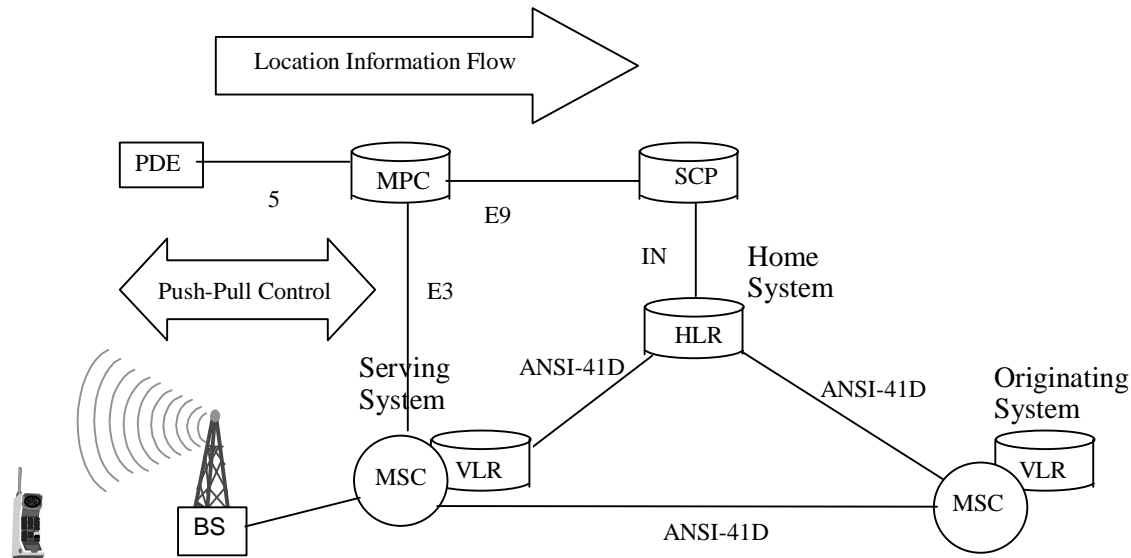


Figure 5.1

The WIN location architecture shall integrate with other network elements in a manner that is:

- Transparent to and independent of E-911 capabilities.
- Transparent to and independent of air interfaces.
- Transparent to and independent of position determining equipment or technology types.
- Capable of supporting subscriber, office and group level zones of coverage.

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### 5.1.1 Asynchronous Event Location Information Push

The WIN location service architecture shall support the capability to have the Mobile Station (MS) initiate the flow of location information to the location-based service logic program based upon the occurrence of an asynchronous event detected by the mobile entity.

By asynchronous, it is meant that the event is independent of time or the event is occurring randomly relative to time. An event refers to some detectable change in the status or state of the Mobile Station or the Mobile entity that should be communicated to the Location-Based service logic program for which the mobile station is subscribed.

Such asynchronous push events would cause the initiation of location information to flow to the service logic program. An asynchronous event based at the mobile entity would trigger the initiation of the flow of location information from the Position Determining Entity (PDE) to the SCF that is host to the subscribed location service. Examples of asynchronous events that would push location information to the service logic program might be as shown: *Actually, “follow” (not “follows”) is correct, but nobody really uses the plural form Also, use bullets, not numbers, unless there is a prioritization issue.*

- Upon MS initial registrations
- Upon MS autonomous registrations
- Upon MS non-autonomous registrations
- Upon MS intersystem handoff boundary transitions between cells or MSCs
- Upon MS zone boundary transitions between zones or billing tiers defined by service provider
- Upon MS state transition/status change (power on, power off, call origination, call termination)
- Under MS program control like the completion of an executable program that resides on the MS.
- Upon surpassing an established threshold, programmed event or to satisfy a request for location information.
- Upon MS radio mode change (e.g., cdma→amps, tdma→amps, band change 800→1900)

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## **5.1.2 Asynchronous Event Location Information Pull**

The WIN location service architecture shall support the capability to have the Service Control Point (SCP) initiate the flow of location information to the location-based service logic program based on some SCP-based asynchronous event.

By asynchronous, it is meant that the event is independent of time or is occurring randomly relative to time. An event refers to some detectable change in the status, state or operations of the service logic program running on the SCP that requests an update of the location information for the subscriber.

Such asynchronous pull events would cause the initiation of location information to flow to the service logic program. An asynchronous event at the SCP would trigger the initiation of the flow of location information from the Position Determining Entity (PDE) to the SCP that is host to the subscribed location service program. Examples of asynchronous events that would pull location information to the service logic program might be as follows:

- Request for information update from the Service Management System (SMS)
- Request for information update as designed by threshold criteria established by the Service Control Function (SCF) when the service logic program was developed.
- Request for information update from other mobility management entities (e.g., HLR)
- Request for information update from other service logic programs.
- In support of the Tiered Services Broadcast Feature.

Asynchronous event information pull should be implemented in the following manner:

1. Independent of active data or voice call processing
2. With no interaction or impact to active voice, SMS, data or other services
3. Upon asynchronous demand of a service logic program (network event/criteria driven)

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### **5.1.3 Synchronous Event Location Information Poll**

The WIN location service architecture shall support the capability to have the SCP poll multiple mobile entities so as to initiate the flow of location information to the location-based service logic program based upon some SCP-based synchronous clock or via a periodic, cyclic request for those mobile entities

By synchronous, it is meant that the flow of information is dependent upon time or is occurring periodically in a repetitive, predictable manner. By poll, it is meant that multiple mobile entities are requested to provide updated location information to the service logic program at the same time. Fleet and Asset Management is a good example of how this capability would be used.

Such synchronous poll operations would cause the initiation of location information to flow to the service logic program from multiple mobile entities in a periodic manner. Synchronous polling triggers the initiation of the flow of location information from the PDE to the SCP that form multiple managed mobile entities. Examples of synchronous events that would poll location information to the service logic program might be as listed:

- Request for periodic information update from the Service Management System (SMS).
- Request for periodic information update as designed by threshold criteria established by the Service Control Function (SCF) when the service logic program was developed.
- Request for periodic information update from other mobility management entities (e.g., HLR).
- Request for information update from other service logic programs.
- Request from a service logic program for periodic updates for multiple mobile entities.
- In support of the Tiered Services Broadcast Feature.

Synchronous event information poll should be implemented in the following manner:

1. Independent of active data or voice call processing
2. With no interaction or impact to active voice, SMS, data or other services
3. Upon synchronous demand of a service logic program (programmable/periodic duty cycles)

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#### **5.1.4 Synchronous Event Location Information Pull**

The WIN location service architecture should support the capability to have the location-based service logic program synchronously pull location information from a subscribed mobile entity.

By synchronous, it is meant that the flow of information is dependent upon time or is occurring periodically in a repetitive, predictable manner. By pull, it is meant that a mobile entity is requested to provide updated location information through the PDE to the service logic program in a periodic manner. Fleet and Asset Management is a good example of how this capability would be used.

Such synchronous pull operations would cause the initiation of location information to flow to the service logic program from a tracked mobile entity in a periodic manner. Synchronous pulling would trigger the initiation of the flow of location information from the PDE to the SCP for the target mobile entity. Examples of synchronous events that would pull location information to the service logic program might be as listed:

- Request for periodic information update from the Service Management System (SMS).
- Request for periodic information update as designed by threshold criteria established by the Service Control Function (SCF) when the service logic program was developed.
- Request for periodic information update from other mobility management entities (e.g., HLR).
- Request for information update from other service logic programs.
- Request from a service logic program for periodic updates for target mobile entity.

Synchronous event information pull should be implemented in the following manner:

1. Independent of active data or voice call processing
2. With no interaction or impact to active voice, SMS, data or other services
3. Upon synchronous demand of a service logic program (programmable/periodic duty cycles)

## 5.2 New Triggers

WIN capabilities provide wireless carriers with expanded flexibility in developing and deploying Location-Based services; however, with this flexibility must come the ability to provide required WIN triggers, so that various Location-Based services may be supported.

As a minimum, the following capabilities are desired:

- Triggers for MS power on, MS power off, MS inactive trigger
- Triggers for zone changes• Triggers for InterMSC handoff (e.g., change in radio mode or band)
- Triggers for IntraMSC handoff (e.g., change in radio channel or cell within an MSC).

## 5.3 Authentication and Privacy Capabilities

The requirement is to develop authentication and privacy capabilities to support Location-Based Services.

Authentication capabilities are required to allow the network to authenticate requests for location information. For example, if an LBC application requested location information on a mobile station, the Mobile Positioning Center may authenticate the request to verify that the application is permitted to have that information. This authentication process could test for two types of permission:

1. Is the application authorized to perform MS location determination in this particular network?
2. Is the application authorized to perform location for this particular Mobile Station?

If both authentication tests are not passed, the request for location information would be denied.

Privacy capabilities are required to protect the security of the mobile station user by allowing the user to block or to restrict location information requests. For example, if a subscriber does not want his/her location to be determined by a Location-Based Service application, s/he may be allowed to restrict such determinations on a permanent basis, or on a call-by-call basis. This capability is somewhat similar to the Calling Number Restriction and Calling Name Restriction capabilities, which allow users to block presentation of their respective name and number information so that it is not presented to the called party. The privacy capability should allow the subscriber to restrict location information requests on a global basis (no applications are permitted to query for location information) or on a selective basis (specified applications are permitted to query for location information).

Authentication and privacy may not be applicable to all Location-Based Services (e.g., FAM). It is at the option of the service provider to determine the applicability for each service.

In general, emergency calls are not subjected to authentication or privacy.

**APPENDIX 1 SAMPLE ACCURACIES (Informative Only)**

The following table is for information only to show typical accuracies for known Location Services applications. It is provided only as FYI, and it is not intended to be used as a Location Services accuracy specification. The application of LBSS may differ between service providers; and, consequently, the actual sample accuracies will vary.

**Table 1: SAMPLE ACCURACIES FOR LOCATION-BASED SERVICES SUPPORT**

| SERVICE   | SAMPLE ACCURACY |            |        |              |         |       |         |                 |
|---|-----------------|------------|--------|--------------|---------|-------|---------|-----------------|
|   | LAT/LONG        | HEIGHT     | H. VEL | V. VEL       | HEAD    | ERROR | LATENCY | REPETITION RATE |
| ENHANCED CALL ROUTING (ECR)   | 800 Meters      | 150 Meters | 8 KPH  | 3 Meters/Sec | 3D - 5° | 10%   | 2 Secs  |                 |
| FLEET AND ASSET MANAGEMENT (FAM) (i.e., THEFT DETECTION AND RECOVERY) | 80 Meters       | 150 Meters | 8 KPH  | 3 Meters/Sec | 3D - 5° | 10%   | 1 Secs  | 3 Secs          |
| LOCATION-BASED CHARGING (LBC)   | 160 Meters      | 150 Meters | 8 KPH  | 3 Meters/Sec | 3D - 5° | 10%   | 2 Secs  |                 |
| LOCATION-BASED INFORMATION (LBI)                                      |                 |            |        |              |         |       |         |                 |
| ROUTE GUIDANCE  | 80 Meters       |            |        |              | 2D - 5° | 10%   | 1 Sec   |                 |
| TRAFFIC INFO  | 80 Meters       |            |        |              | 2D - 5° | 10%   | 2 Secs  |                 |
| EMERGENCY ASSISTANCE /E911  | 80 Meters       | 150 Meters | 8 KPH  | 3 Meters/Sec | 3D - 5° | 10%   | 1 Sec   | 3 Secs          |
| HANDSET BASED SERVICES (i.e., USER ZONE DETECTION IN TIERED SERVICES) | 80 Meters       | 150 Meters | 8 KPH  | 3 Meters/Sec | 3D - 5° | 10%   | 2 Secs  |                 |

**NOTES:**

- APP ENTITY = Entity which is running the application which uses the mobile location and, therefore, the Entity which needs to own the finally-calculated location information.
- These values represent “normal operation” requirements. Increased performance may be required based upon the perceived urgency (i.e., emergency, loss of property, etc.).
- The representation rate is intended to be the maximum rate required in automatic reporting modes for that particular application. Normal operations would typically use much lower rates.

| 1  | APPENDIX 2 | ACRONYMS/ABBREVIATIONS                           |
|----|------------|--|
| 2  |            |  |
| 3  | AIN        | Advanced Intelligent Network                     |
| 4  | AMA        | Automatic Message Accounting                     |
| 5  | ANSI       | American National Standards Institute            |
| 6  | BCSM       | Basic Call State Model                           |
| 7  | CCF        | Call Control Function                            |
| 8  | CDR        | Call Detail Record                               |
| 9  | CS-n       | Capability Set n                                 |
| 10 | CTIA       | Cellular Telecommunications Industry Association |
| 11 | DFP        | Distributed Functional Plane                     |
| 12 | ECR        | Enhanced Call Routing                            |
| 13 | FAM        | Fleet and Asset Management                       |
| 14 | FE         | Functional Entity                                |
| 15 | HLR        | Home Location Register                           |
| 16 | IMSI       | International Mobile Station Identity            |
| 17 | IN         | Intelligent Network                              |
| 18 | INAP       | Intelligent Network Application Protocol         |
| 19 | IP         | Intelligent Peripheral                           |
| 20 | ISDN       | Integrated Services Digital Network              |
| 21 | ITU        | International Telecommunications Union           |
| 22 | LBC        | Location-Based Charging                          |
| 23 | LBSS       | Location-Based Services System                   |
| 24 | LBIS       | Location-Based Information Service               |
| 25 | MS         | Mobile Station                                   |
| 26 | MSC        | Mobile Switching Center                          |
| 27 | NE         | Network Entity                                   |
| 28 | NRM        | Network Reference Model                          |
| 29 | PDE        | Position Determination Entity                    |
| 30 | PN         | Project Number                                   |
| 31 | PSTN       | Public Switched Telephone Network                |
| 32 | SCE        | Service Creation Environment                     |
| 33 | SCF        | Service Control Function                         |
| 34 | SCP        | Service Control Point                            |
| 35 | SDF        | Service Data Function                            |
| 36 | SMS        | Service Management System                        |
| 37 | SN         | Service Node                                     |
| 38 | SRD        | Standards Requirements Document                  |
| 39 | SSF        | Service Switching Function                       |
| 40 | SS7        | Signaling System 7                               |
| 41 | SSP        | Service Switching Point                          |
| 42 | TDP        | Trigger Detection Point                          |
| 43 | TIA        | Telecommunications Industry Association          |
| 44 | WIN        | Wireless Intelligent Network                     |
| 45 |            |  |

## APPENDIX 3 USE CASE MAPS (informative Only)

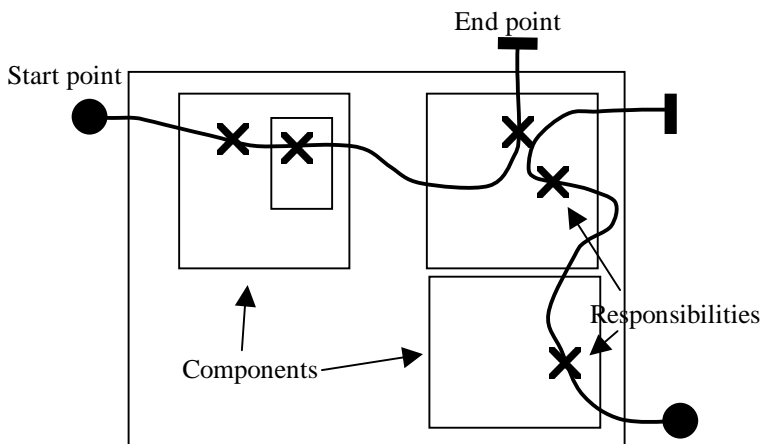
The following Use Case Maps are derived from the Version 1.5 (August 22, 2000) of the draft of the document titled “Stage 1: 3GPP2 Location-Based Service System” with the reference S00-20000822-xxx.

# DOCUMENTATION CONVENTION

Each Use Case Map has up to five components:

- a diagram
- a description of the map
- a description of each responsibility
- a description of each map element (i.e. start points, wait points, and end points)
- a description of each stub (if any)

## I. A Use Case Maps quick reference guide



Imagine tracing a path through a system of objects to explain a causal sequence, leaving behind a visual signature. Use Case Maps capture such sequences. They are composed of:

• **start points** (filled circles representing pre-conditions or triggering causes)

• causal chains of **responsibilities** (crosses, representing actions, tasks, or functions to be performed)

• and **end points** (bars representing post-conditions or resulting effects).

The responsibilities can be bound to **components**, which are the entities or objects composing the system.

Fig. 1: Basic notation and interpretation

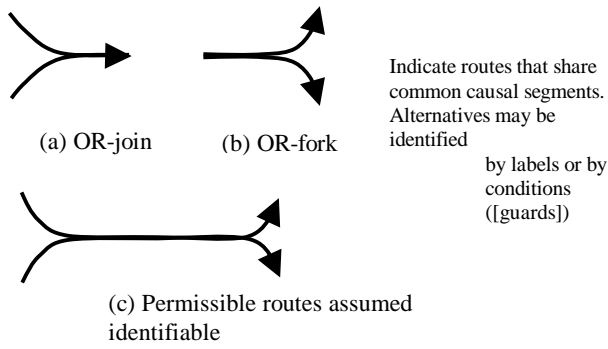


Fig. 2: Shared routes and , OR-Forks, OR-Joins

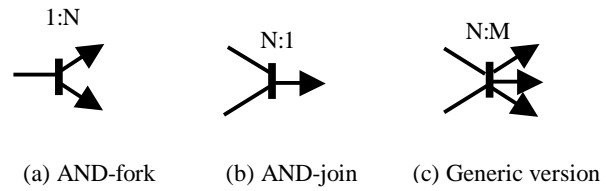


Fig. 4: Concurrent routes with AND-forks and AND-joins

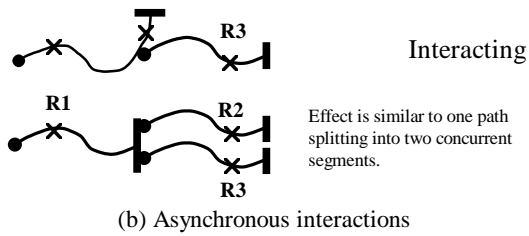
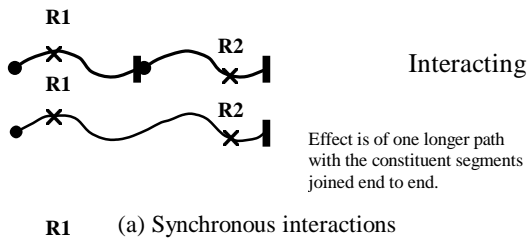


Fig. 3: Path interactions.

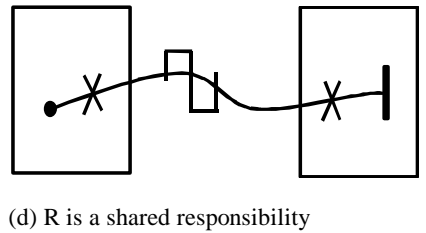
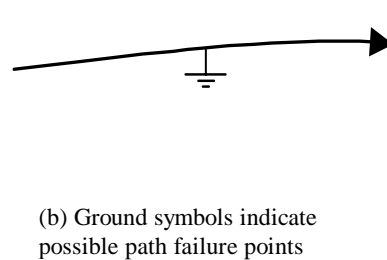
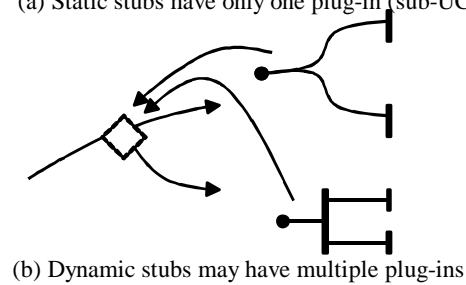
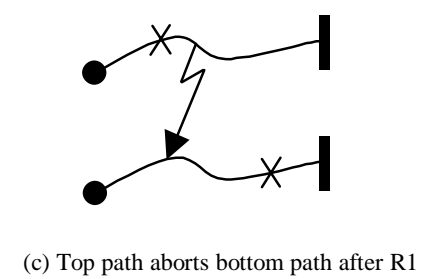
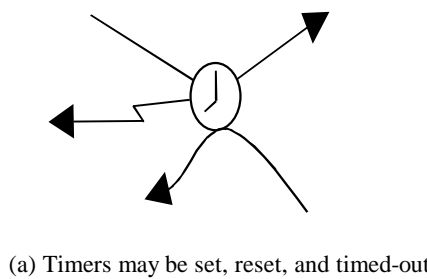
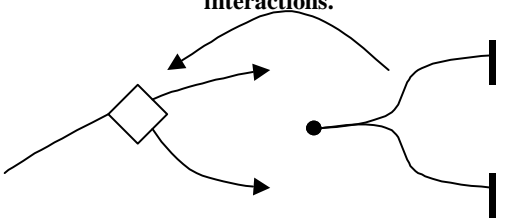


Fig. 6: stubs and plug-ins.

Fig. 7: Timers, failures and shared responsibilities.

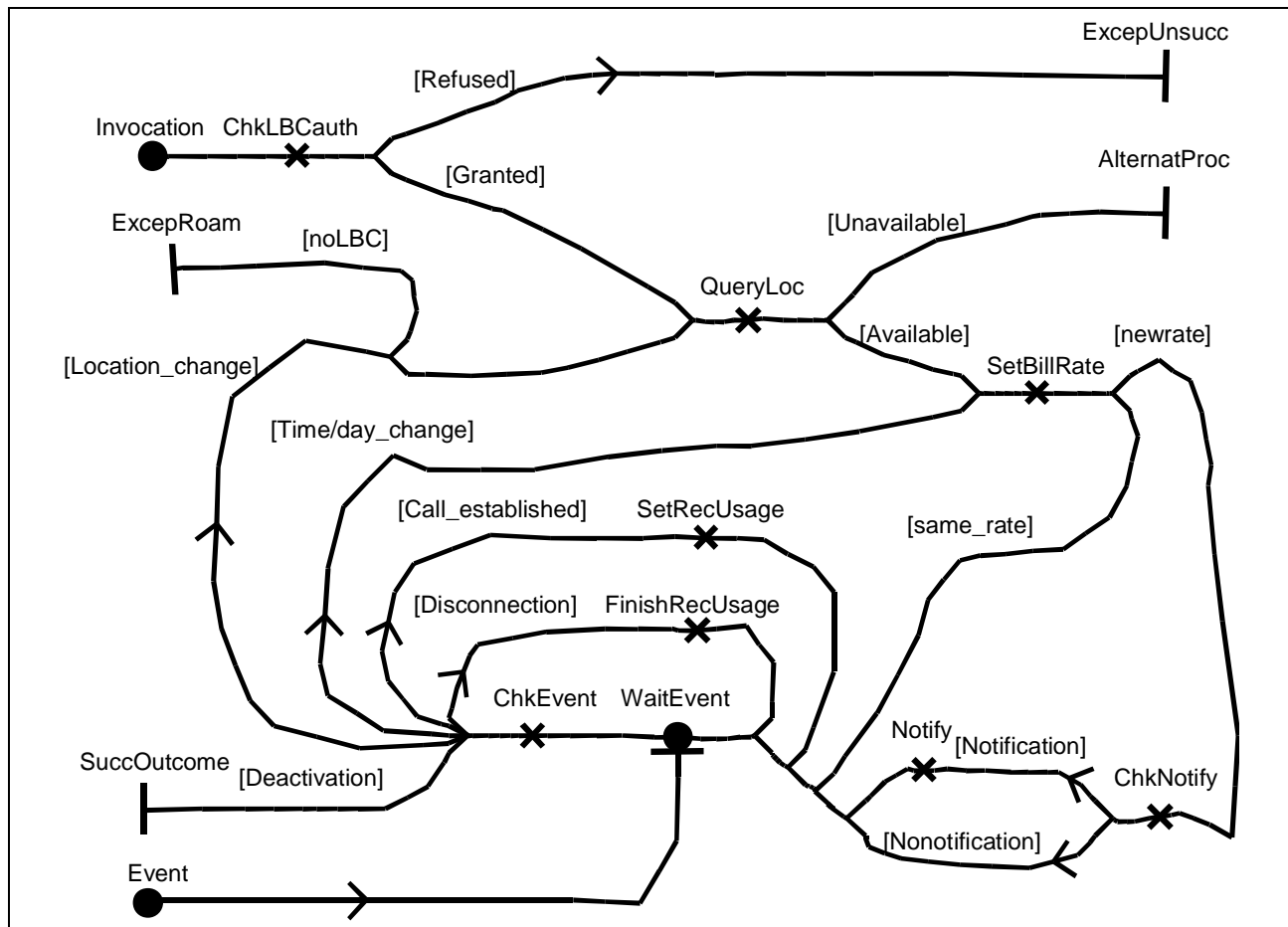
## . Use Case Maps for Location-Based Services

Location-based services are services that require the service provider to have access to the location information of the subscriber, and this information is fundamental to delivery of the location-based services.

### LBC - Location-Based Charging

Location-Based Charging (LBC) is a service that provides the functionality of charging different rates based on the location of the subscriber.

#### Use Case Map



#### Responsibilities

##### ChkLBCauth

Check if the user is a subscriber to the LBC Service and the service is activated.

**QueryLoc**

The current User Location is sought.

**SetBillRate**

Set the billing rate based on the location/time/day.

**Notify**

The user is notified of the location zone and/or the billing tier and/or a change of location.

**FinishRecUsage**

Record call details so that multiple tier billing for LBC services can be achieved.

**SetRecUsage**

Start the timer to measure call duration.

**ChkNotify**

Check if the notification option of the user is active. If active, the location zone or the billing tier will be notified to the user as well as any change of their value.

**ChkEvent**

Determine whether the event is a call connection, a call disconnection, a location/time/day change or a deactivation.

## Map Elements

**Start Point - Invocation**

Initial registration is assumed here.

[\*\*\* LBC may be invoked in four different ways:initial mobile station registration,autonomous registration, or by calls placed, or received by the mobile station, but normal operation is defined only for initial registration in this SRD. \*\*\*]

**Waiting-Place - WaitEvent**

Wait for a call connection/disconnection, a location/time/day change or deactivation.

**End Point - ExcepUnsucc**

Unsuccessful termination or Exception procedure

[\*\*\* This is not explicitly defined in this SRD. But according to Basic assumption 14, any entity which does not have the capability to support location services will continue to operate normally, even after receiving any LBSS message. We could therefore assume that the call continues as an ordinary (i.e. non-LBC) call. \*\*\*]

**Start Point - Event**

Call connection or disconnection,location/time/day changeor deactivation.

**End Point - AlternatProc**

Alternative procedures

**End Point - SuccOutcome**

Successful outcome

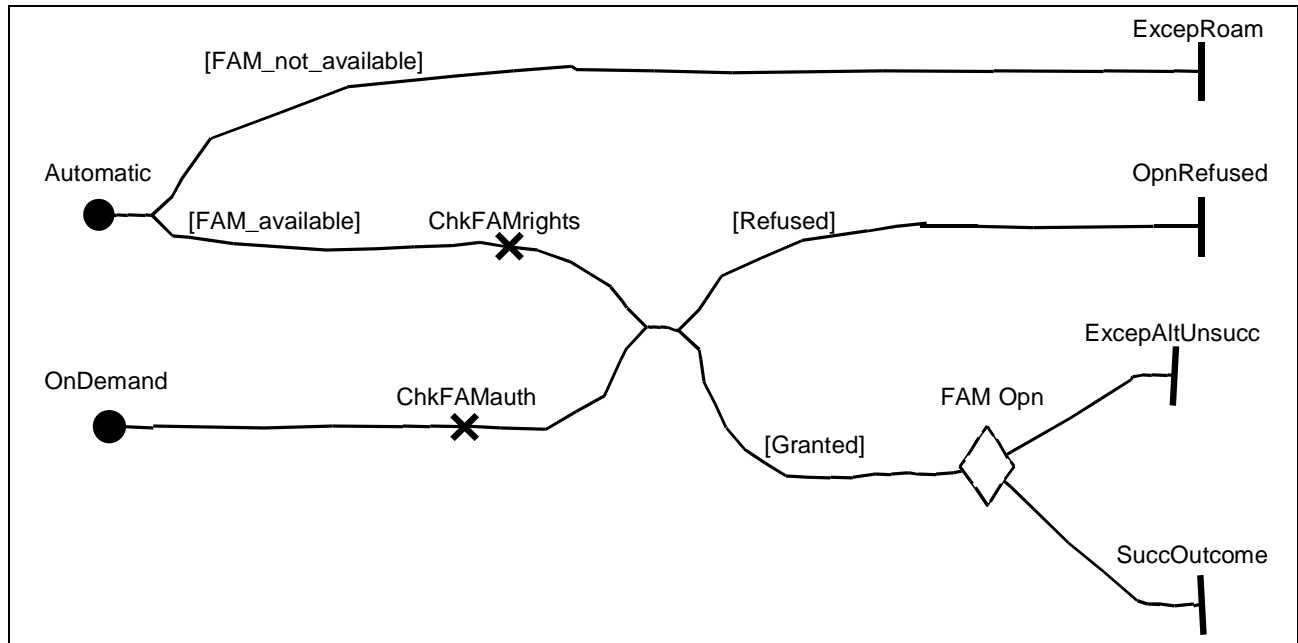
**End Point - ExcepRoam**

Exceptions while roaming.

[\*\*\* In the SRD, there is no mention of call details record nor the ultimate disposition of the call. \*\*\*]

## FAM - Fleet and Asset Management

### Use Case Map



### Responsibilities

#### ChkFAMrights

Authenticate the user of the FAM Service and check if the automatic activation option is active.

#### ChkFAMauth

Authenticate the user of the FAM Service.

### Map Elements

#### Start Point - Automatic

Change of zone or Periodic updates

[\*\*\* SDR Section 5.4.2.2 indicates that FCU may provide position data to the FAM supervisor on a periodic basis. Hence, underling should be able to update their location similarly. \*\*\*]

#### Start Point - OnDemand

update status; request location/status; SMS/voice origination/termination; add/delete FU

#### End Point - SuccOutcome

Successful outcome

#### End Point - ExcepAltUnsucc

Unsuccessful termination, Exception or Alternative procedure

#### End Point - ExcepRoam

Exceptions while roaming

#### End Point - OpnRefused

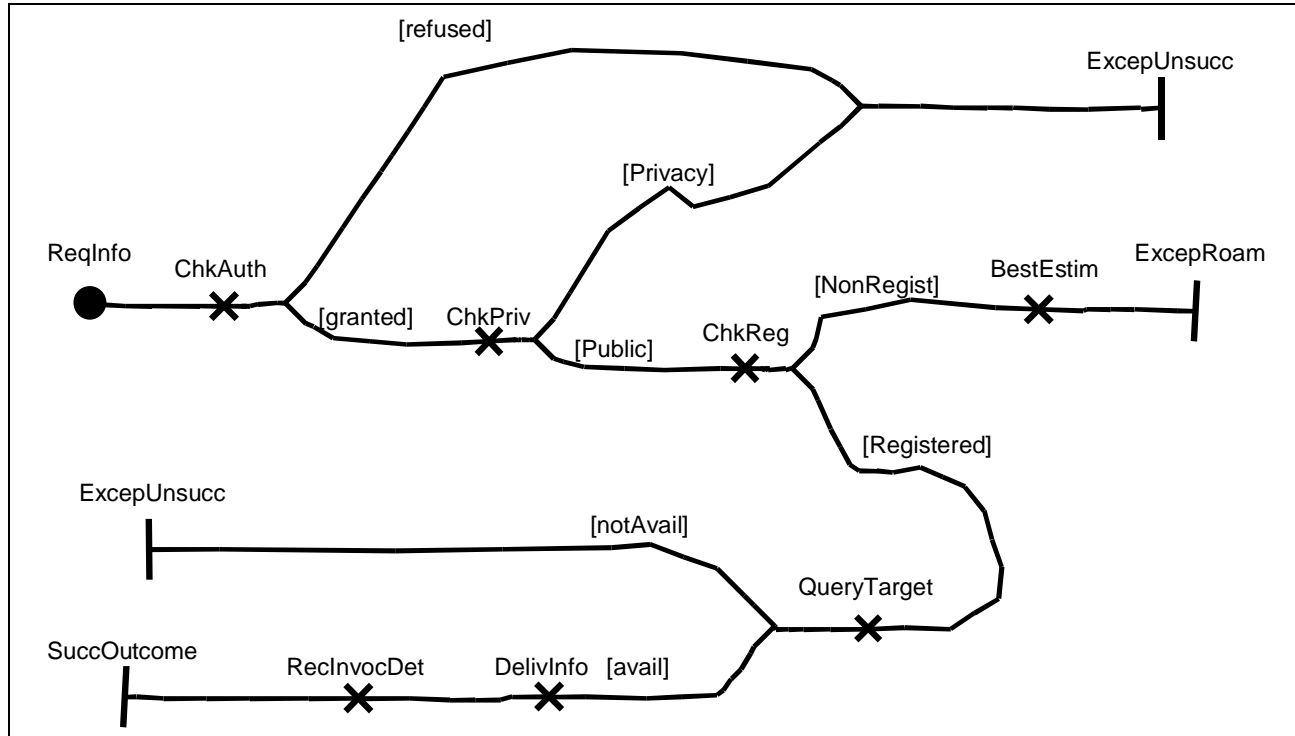
[\*\*\* The SDR does not stipulate how to process illegitimate requests. \*\*\*]

#### Stub - FAM Opn

Operation may consist in Requesting or Sending information.

## FAM\_Request - FAM Request of Location/Status

### Use Case Map



### Responsibilities

**BestEstim**

Send best estimate/last location and status.

**QueryTarget**

Query the location and status of the target unit.

**DelivInfo**

The information concerning the location is delivered to the user in the context of the call (manual invocation) or in the form of text or map information (automatic invocation).

**ChkPriv**

Check if the target unit has "blocked" its information.

**ChkReg**

Check if the target unit is requested.

**ChkAuth**

Check if requesting unit has authorization to obtain the requested information.

**ReclnvocDet**

Record the details related to the current invocation of LBIS.

### Map Elements

**Start Point - ReqInfo**

Request location/status information.

**End Point - SuccOutcome**

Successful outcome

**End Point - ExcepUnsucc**

Unsuccessful termination or Exception procedure

**End Point - ExcepRoam**

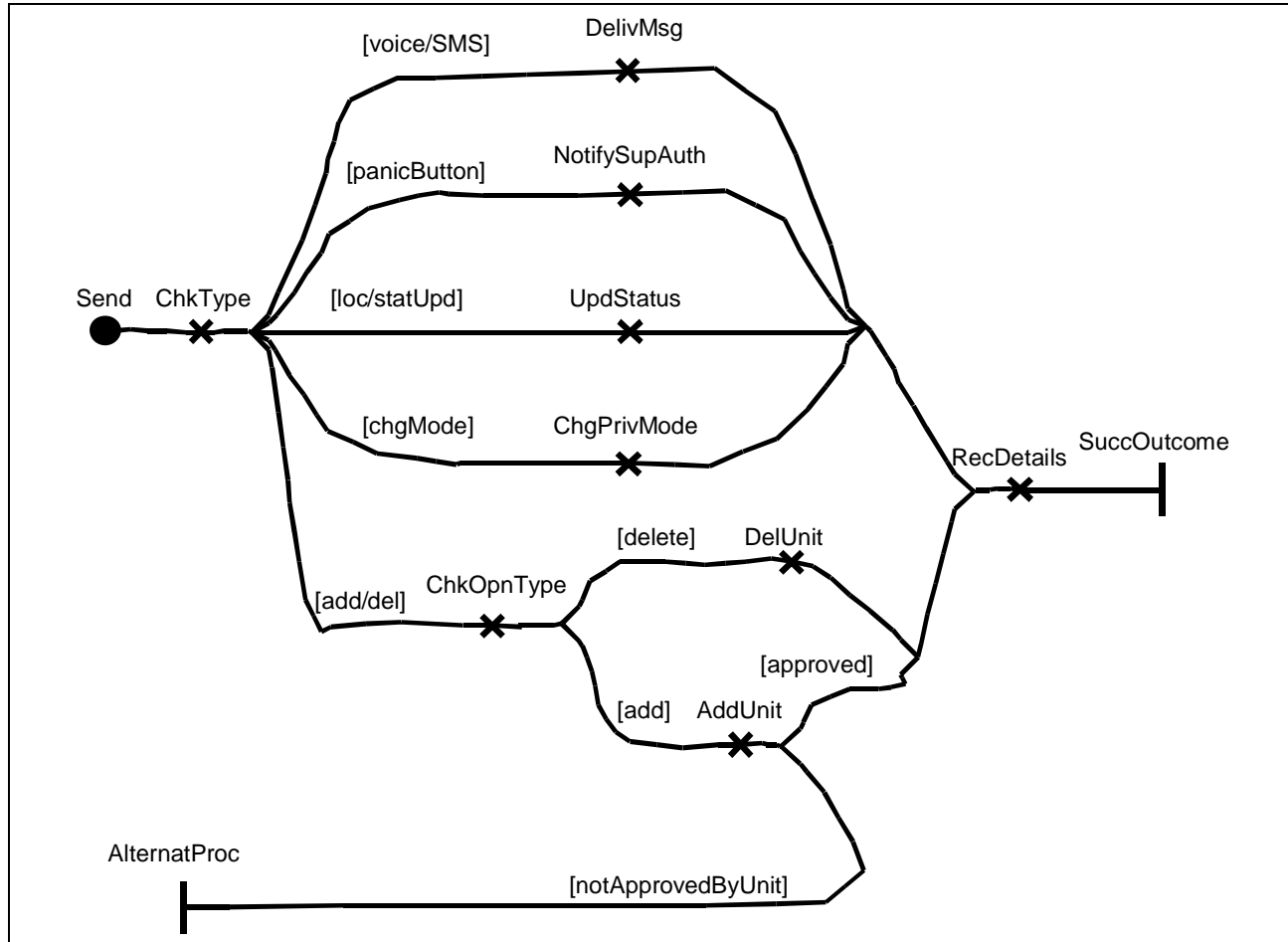
Exceptions while roaming

**End Point - ExcepUnsucc**

Unsuccessful termination or Exception procedure

## FAM\_Send - FAM Sending of Msg/Upd/Panic

### Use Case Map



### Responsibilities

#### NotifySupAuth

Notify the FAM supervisor and/or appropriate authorities.

#### RecDetails

The details of the invocation of the FAM service are recorded.

#### DelivMsg

Deliver the message

#### ChkType

Check the type of the message: "location/status update", "panic button", "voice/short message", "change mode (privacy)"

#### ChkOpnType

Check if it is a request to add or delete a unit.

#### DelUnit

Delete a unit

#### AddUnit

Add unit to the fleet if the unit approves.

#### UpdStatus

Update the status information

**ChgPrivMode**

Change privacy/public mode

## Map Elements

**Start Point - Send**

Type of information:location/status update, panic button, voice/short message exchange mode (privacy)

**End Point - SuccOutcome**

Successful outcome

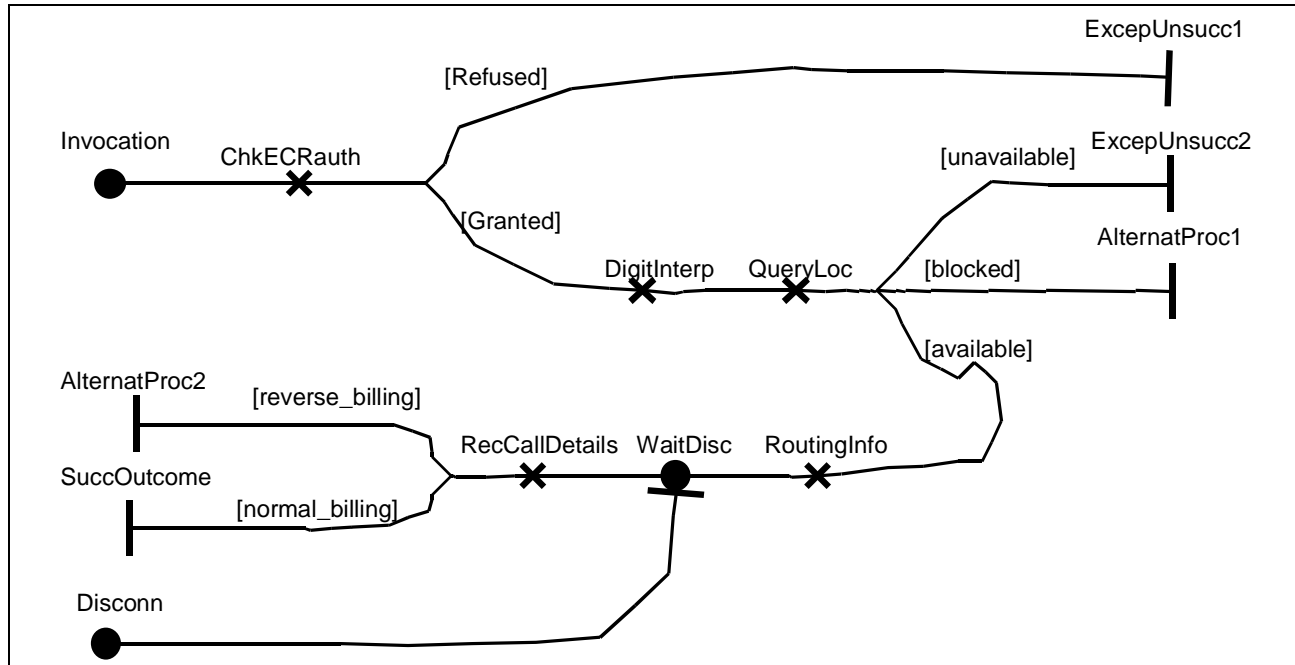
**End Point - AlternatProc**

FAM privacy.

## ECR - Enhanced Call Routing Service

Enhanced Call Routing (ECR) allows calls to be routed to the appropriate geographic destination based on the location/position of the mobile.

### Use Case Map



### Responsibilities

#### ChkECRauth

Check if the user is a subscriber to the ECR Service, and if the service is activated.

#### QueryLoc

The current User Location is sought.

#### DigitInterp

The Serving MSC interprets the dialed digits, e.g. either as a directory number or as an abbreviated dialing string. For instance 427 might be interpreted as GAS.

#### RoutingInfo

The address or directory number of the called party is provided so that the call can be routed.

#### RecCallDetails

Record call details of the billing, optionally billing the owner of the ECR number.

### Map Elements

#### Start Point - Invocation

For initiation of ECR from the mobile station, the user enters the "#" abbreviated dialing code followed by supplementary digits(e.g. any number of digits to be interpreted by the MSC).

#### End Point - ExcepUnsucc1

Unsuccessful termination or Exception procedure.

[\*\*\* SRD does not explicitly specify call disposition. However, the call will likely fail during digit translation.

\*\*\*]

**End Point - SuccOutcome**

Successful outcome

**Waiting-Place - WaitDisc**

Wait for call termination indication.

**Start Point - Disconn**

Indication that the call is terminated.

**End Point - AlternatProc2**

The owner of the ECR number is billed

**End Point - ExcepUnsucc2**

Exceptions procedures or Unsuccessful Outcome.

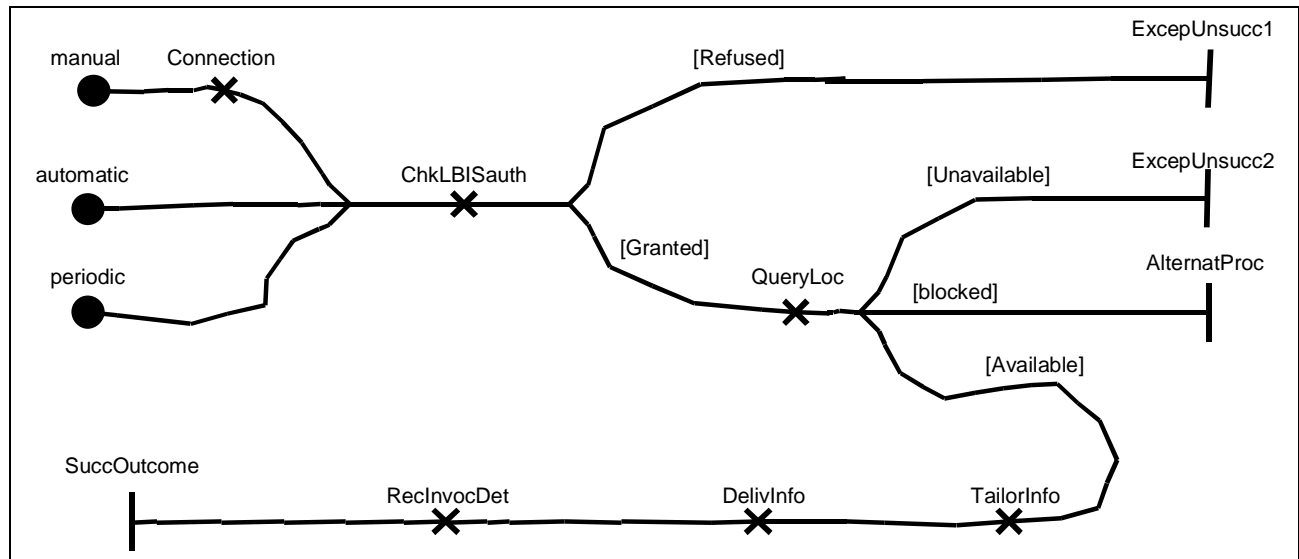
**End Point - AlternatProc1**

Alternative Procedures when the ECR subscriber has blocked his or her location information.

## LBIS - Location-Based Information Service

Location-Based Information Service (LBIS) allows subscribers to access information services for which the information content is tailored to the current location of the subscriber.

### Use Case Map



### Responsibilities

#### QueryLoc

The current User Location is sought.

#### ChkLBISAuth

Check if the user is a subscriber to LBIS and if the service has been activated.

#### RecInvocDet

Record the details related to the current invocation of LBIS.

#### Connection

The user is connected to the service provider.

#### TailorInfo

The service provider tailors the information as per the current location.

#### DelivInfo

The information concerning the location is delivered to the user in the context of the call (manual invocation) or in the form of text or map information (automatic invocation).

### Map Elements

#### Start Point - automatic

LBIS may be invoked automatically by the network upon detection of a trigger (such as the "power on" trigger or "zone change" trigger)

#### End Point - SuccOutcome

Successful outcome

#### End Point - ExcepUnsucc1

Unsuccessful termination or Exception procedure.

[\*\*\* SRD does not explicitly specify call disposition. \*\*\*]

**Start Point - manual**

LBIS may be invoked manually by the subscriber originating a call to a Directory Number associated with the specific location-based information service(as in "DN + SEND").

**End Point - ExcepUnsucc2**

Exceptions procedures or Unsuccessful outcome when the location information is not available.

**End Point - AlternatProc**

Alternative procedures when the LBIS subscriber has blocked his or her location information.

**Start Point - periodic**

Periodic triggering of the service logic.