SOURCE: **TIA Engineering Committee TR-45**

TITLE: **Location-based Services - Standards Status Report**

AGENDA ITEM: **4.3 Identification and Location Services**

DOCUMENT FOR:

Decision	
Discussion	
Information	**X**

1. Decision or Action Requested

No decision or action is requested. This contribution presents, for the information of the participants, a report of the TIA Engineering Committee TR-45 Location Services – Standards Status as of 25 April 2003.

2. References

Information on TIA TR-45 standards can be found at http://www.tiaonline.org

3. Issues for Discussion

This contribution presents a report of the TIA Engineering Committee TR-45 Location-based Services – Standards Status as of 25 April 2003. The contribution contains the following information.

- An Overview of the TIA Engineering Committee TR-45
- TR-45.2 Wireless Intersystem Technology Location-based Services Standards Status
- TR-45.5 Spread Spectrum Digital Technology Location-based Services Standards Status
- TR-45.3 Time Division Digital Technology Location-based Services Standards Status
- TR-45.1 Analog Technology Location-based Services Standards Status
- A Few References
- A Few Acronyms and Definitions

Engineering Committee TR-45

Location-based Services Standards Status Report April 2003

Outline

- Engineering Committee TR-45 Overview
- TR-45.2 Wireless Intersystem Technology Standards
- TR-45.5 Spread Spectrum Digital Technology Standards
- TR-45.3 Time Division Digital Technology Standards
- TR-45.1 Analog Technology Standards
- A Few References
- A Few Acronyms and Definitions

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TIA TR-45 Coordination with 3GPP2

- TR-45 and 3GPP2 have been closely coupled and have undertaken many joint work projects for the last four years.
  - TR-45.2 TSG-N (Core Network)
  - TR-45.4 TSG-A (IOS)
  - TR-45.5 TSG-C (cdma2000)
  - TR-45.6 TSG-P (packet network architecture)
- Recent 3GPP2 Organizational Change
  - TSG-X TSG-N + TSG-P.
- TIA TR-45 is the standards organization that publishes 3GPP2 specifications.
- TR45 supports the ballot and publication of 3GPP2 specs.
- Clear delineation between TR-45 and 3GPP2 projects.

Location-based Services Standards

TR45.2 Wireless Intersystem Technology Standards

- TIA-881, "Location Services Security, Privacy, Authentication and other Enhancements," planned publication November 2003
- TIA-843, "Wireless Intelligent Network (WIN) Capabilities for Location-Based Services," planned publication November 2003
- TIA/EIA/J-STD-036-A Addendum 1, March 2003
- TIA/EIA/J-STD-036-A "Enhanced Wireless 9-1-1 Phase 2," March 2002
- TIA/EIA/J-STD-036 Addendum 1, December 2000
- TIA/EIA/J-STD-036 "Enhanced Wireless 9-1-1 Phase 2," August 2000

TR45.5 Spread Spectrum Digital Technology Standards

- TIA-801-A "*Position Determination Service Standard for Dual - Mode Spread Spectrum Systems, Revision A,"* planned publication 4Q2003
- TIA-801-1, "Position Determination Service Standard for Dual – Mode Spread Spectrum Systems, Addendum 1," February 2001
- TIA-801, "Position Determination Service Standard for Dual – Mode Spread Spectrum Systems," October 1999

Location-Based Services Standards

TR45.3 Time Division Digital Technology Standards

» TIA/EIA-136-740 *"TDMA Third Generation Wireless System Assisted Mobile Positioning through Satellite (SAMPS),"* April 23, 2001

» TIA/EIA/IS-869 *"TDMA Third Generation Wireless Analog SAMPS Support in TIA/EIA-136-C,"* June 14, 2001

» ANSI/TIA/EIA-136-741 *"TDMA Third Generation Wireless System Assisted Mobile Positioning through Satellite (SAMPS) in Analog Systems,"* April 2002

TR45.1 Analog Technology Standards

» TIA/EIA/IS-817, "A Position Determination Service Standard for Analog Systems, " July 10, 2000

TIA-881 "*Location Services Security, Privacy, Authentication and other Enhancements,*" publication November 2003

- Extends the network capabilities defined in J-STD-036 for commercial Location-based Services (LCS) and user privacy (i.e., Location Information Restrictions (LIR))
  - Applicable to a MS that is idle, has established a call, or is engaged in another telecommunications service
- New capabilities recently introduced!
  - Up to two Mobile Positioning Centers (MPCs) per MSC
  - Could support more than one Commercial Service MPC
  - Emergency Services MPC – Commercial Services MPC
    - Interaction of Emergency & Commercial services position determination

TIA-881 (continued)

- Commercial applications can query for MS position
  - application requests Position Quality of Service (PQOS)
  - position of idle MS can be determined
    - CDMA Handset Assisted only
  - call-related location services
    - request for geographic position of MS only applicable during the call
    - e.g., Emergency Services, Enhanced Call Routing
- Location-based services are subject to the Location Information Restrictions (LIR) specified by the MS subscriber
  - restricts access of MS position information to authorized subscribers

TIA-843, "*Wireless Intelligent Network (WIN) Capabilities for Location-Based Services,*" publication November 2003

- » Builds on TIA-881
- » Enables WIN services to be tailored to the MS position
  - » e.g., Fleet and Asset Management (FAM), Location Based Charging (LBC), Location Based Information Service (LBIS) and Enhanced Call Routing (ECR)
- » Applications can directly query Serving MPC for MS position
  - » Bypass Home Mobile Positioning Center (MPC)
  - » SCF can request (from HLR) automatic updates on system serving the MS and MS active/inactive status
- » Call initiated WIN location–based services

SCF - Service Control Function

TIA-843 (continued)

- Fleet and Asset Management (FAM)
  - enables the position of one or more MSs to be tracked
  - MS position can be tracked if MS is idle or is engaged in a call or other telecommunications service
- Location Based Charging (LBC)
  - enables a wireless subscriber to be charged different rates for telecommunications services based on the MS position
- Location Based Information Service (LBIS)
  - enables subscribers to access information services for which the information content is tailored to the current MS position
- Enhanced Call Routing (ECR)
  - enables calls to be routed to the appropriate destination based on the MS position

TR-45.2 Wireless Intersystem Technology Standards

TIA/EIA/J-STD-036-A "*Enhanced Wireless 9-1-1 Phase 2,*" published March 2002

- » Emergency Services Phase II Enhancements
  - » e.g., CDMA Mobile Originated Position Determination

TIA/EIA/J-STD-036-A Addendum 1, March 2003

- » Emergency services call routing based on interim position measurements
- » Non-dialable call back numbers
  - » Normative (vs. informative) text
  - » Clarification of ESN encoding for call back number
- » Other clarifications and corrections

TR-45.2 Wireless Intersystem Technology Standards – Future Work Plans

- Location-based Services enhancements candidate features
  - Future versions of TIA-881
  - MS initiated position determination
  - Multiple Value Added Service (VAS) MPCs per MSC
  - Intersystem procedures for MPC and PDE network entities
  - Full support of TIA-801
    - e.g., multiple concurrent position determination sessions

TIA/EIA/J-STD-036 "*Enhanced Wireless 9-1-1 Phase 2*" published August 2000

- J-STD-036 is a Joint Standard with T1P1. Developed to address the Public Safety community's need for a common standard that could be used for all networks
- Standardizes the intersystem operations for determining the position (e.g., latitude and longitude) of an emergency services caller and delivering the position to the Emergency Services Provider
- Position information may be delivered as part of a call setup – Call Associated Signaling
- Position information may be delivered though a separate data service – Non Call Associated Signaling
- Supports position determination for CDMA, TDMA and Analog air interfaces

TR-45.2 Wireless Intersystem Technology Standards

TIA/EIA/J-STD-036 (continued)

- Defines new network entities and the network architecture needed for Wireless 9-1-1 Phase 2
  - Position Determining Entity (PDE)
  - Mobile Positioning Center (MPC)
- Supports network-based position determination
- Supports MS-assisted modes of position determination
- Supports MS-based modes of position determination

TIA/EIA/J-STD-036 Addendum 1, December 2000

- Position determination after intersystem handoff
- Support for SAMPS *Emergency Position Report*

TR-45.5 Spread Spectrum Digital Technology Standards

TIA/EIA/IS-801 "*Position Determination Service Standard for Dual - Mode Spread Spectrum Systems,*" October 1999

- » The first CDMA position location standard developed in TIA TR-45.5
- » Standardizes air-interface between the MS and the BS
- » Adjunct to the IS-95-B standard
- » Primary focus on emergency services (E911)
- » Defines messages and a message transport method for the circuit-switched (CS) domain
- » Supports MS-based and MS-assisted modes of operation

TIA/EIA/IS-801-1 "*Position Determination Service Standard for Dual - Mode Spread Spectrum Systems, Addendum 1,*" February 2001

- » Developed as an Addendum to TIA/EIA/IS-801 in 3GPP2 TSG-C
- » Addressed bug fixes and removed inconsistencies
- » Added satellite health message for MS-based mode

TR-45.5 Spread Spectrum Digital Technology Standards – Current Work

TIA-801-A ***"Position Determination Service Standard for Dual - Mode Spread Spectrum Systems, Revision A,"*** **planned for publication December 2003**

Features under consideration for inclusion in TIA-801-A:

- » Transmission of ephemeris during handoff from CDMA to analog
- » Coarse Location
- » Position Location broadcast
- » Support for IS-2000 Revisions
- » Optional TCP/IP transport

TR-45.5 Spread Spectrum Digital Technology Standards – Current Work

- Space Vehicle (SV) specific GPS ephemeris request
- SV and time specific GPS Sensitivity Assistance request
- Message from the MS to the BS containing the neighbor list
- Indicate type of fix (GPS, AFLT, Hybrid) in location response
- Messaging from BS to MS to indicate estimated max time uncertainty
- Add health indicator in acquisition assistance message
- Allow reporting zero measurements
- Use of broadcast channels for Orbital Information and Reference location
- Add second order Doppler term in *Provide GPS Acquisition Assistance* message
- Add QoS support consistent with that of TIA-881

AFLT - Advanced Forward Link Trilateration

TR-45.3 Time Division Digital Technology Standards

TIA/EIA-136-740 *"TDMA Third Generation Wireless System Assisted Mobile Positioning through Satellite (SAMPS),"* April 23, 2001

TIA/EIA/IS-869 *"TDMA Third Generation Wireless Analog SAMPS Support in TIA/EIA-136-C,"* June 14, 2001

ANSI/TIA/EIA-136-741 *"TDMA Third Generation Wireless System Assisted Mobile Positioning through Satellite (SAMPS) in Analog Systems,"* April 2002

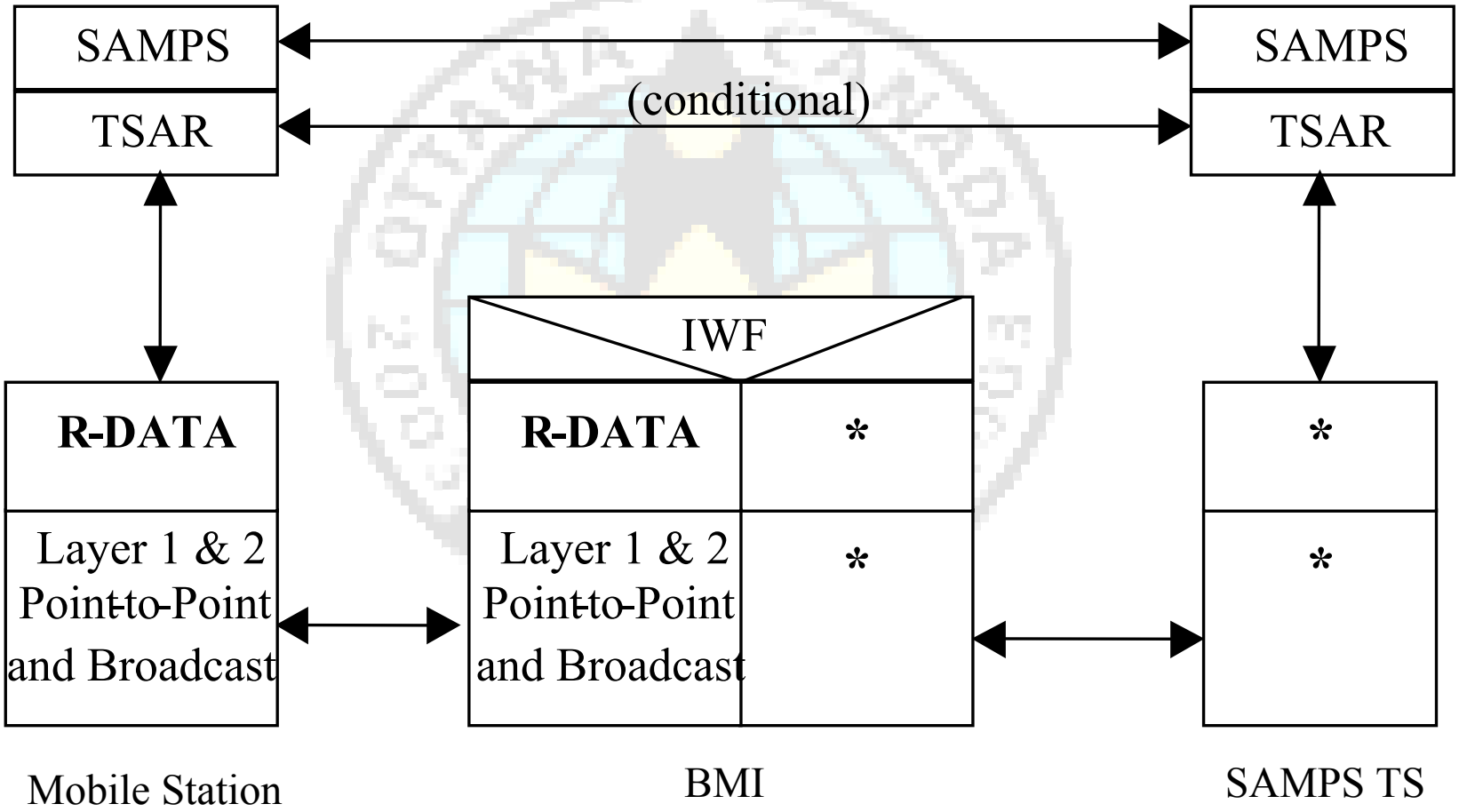
TIA/EIA-136-740: Mobile-based mode

- Position is computed by the Mobile Station (MS)
- Uses existing Global Positioning System (GPS) infrastructure
- Mobile Station may use GPS assistance data from the Teleservice Server (TS) to:
  - Reduce GPS acquisition time
  - Increase sensitivity
  - Compute satellite position
  - Improve position determination accuracy
- Uses the R-DATA message transport mechanism (common to many teleservices)

TIA/EIA-136-74O: Mobile-assisted mode

- Position in computed by the Teleservice Server (TS) using pseudo-range data measured at the Mobile Station
- Uses existing Global Positioning System (GPS) infrastructure
- Mobile Station may use GPS assistance data from the Teleservice Server (TS) to:
  - Reduce GPS acquisition time
  - Increase sensitivity
- Uses the R-DATA message transport mechanism (common to many teleservices)

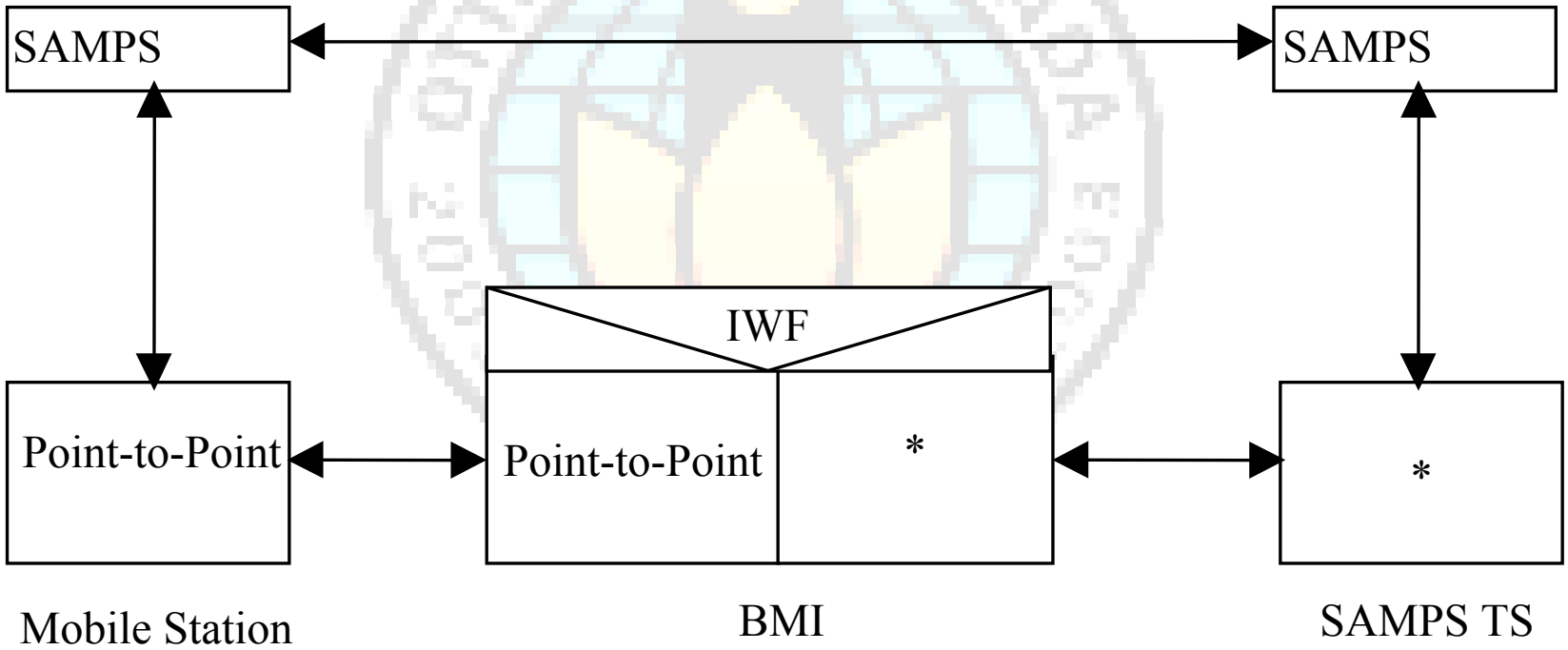
TIA/EIA-136-740



TIA/EIA/IS-869 *"TDMA Third Generation Wireless Analog SAMPS Support in TIA/EIA-136-C,"* June 14, 2001

- The System Assisted Mobile Positioning through Satellite (SAMPS) teleservice defines the procedures and signaling for a handset-based positioning service.
- SAMPS addresses subscriber-position requirements in TIA/EIA-136 based networks by utilizing the existing Global Positioning System (GPS) infrastructure.
- SAMPS utilizes the data and signaling capabilities of TIA/EIA-136 and this specification to enhance the performance of GPS-equipped MS by providing "GPS assistance."
- Uses the same analog transport defined in the TR-45.1 developed TIA/EIA/IS-817 standard.

TIA/EIA/IS-869



TR-45.1 Analog Technology Standards

TIA/EIA/IS-817 *"A Position Determination Service Standard for Analog Systems,"* July 10, 2000

- Defines the messages exchanged between the Mobile Station (MS) and the Position Determination Entity (PDE). Together with the MS and PDE procedures defines a method of position determination services for operation in analog mode.
- Supports both mobile assisted and mobile based Location Services (LCS.)
- Follows the analog voice channel message structure and mobile station & base station procedures in TIA/EIA-553-A, limiting the need for modifications to analog Base Stations (BS) to support position determination services as required by E-911.

A Few References

- http://www.3gpp2.org
- http://web.ansi.org
- http://www.tiaonline.org
- http://www.t1.org

A Few Acronyms & Definitions

3GPP2	Third Generation Partnership Project 2
AFLT	Advanced Forward Link Trilateration
AHG	Ad Hoc Group
BMI	Base Station, MSC, and Interworking Function
BS	Base Station
CDMA	Code Division Multiple Access
CS	Circuit Switched
ECR	Enhanced Call Routing
EIA	Electronic Industries Alliance
ESN	Equipment Serial Number
FAM	Fleet and Asset Management
GPS	Global Positioning System
HLR	Home Locator Registry
IP	Internet Protocol
IOS	Inter-Operability Specifications
IWF	Interworking Function
J-STD	Joint Standard
LAES	Lawfully Authorized Electronic Surveillance
LCS	Location Services

A Few Acronyms & Definitions

LBC	Location Based Charging
LBIS	Location Based Information Services
LIR	Location Information Restriction
MPC	Mobile Positioning Center
MS	Mobile Station
MSC	Mobile Switching Center
PDE	Position Determination Entity
PQOS	Position Quality of Service
PS	Packet Switched
SAMPS	System Assisted Mobile Positioning through Satellite
SCF	Service Control Function
SV	Space Vehicle
TDMA	Time Division Multiple Access
TIA	Telecommunication Industry Association
TS	Teleservice Server
TSG-C	Technical Specification Group - CDMA Air Interface
TSAR	Teleservice Segmentation And Reassembly
UIM	Universal Interface Module
VAS	Value Added Services (i.e., commercial)
WIN	Wireless Intelligent Network

Thank you

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