

Cellular Networking Perspectives

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Next issue due: May 2, 1995

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IS-41 Rev. C Goes to Ballot

After a long gestation period, IS-41 Revision C has finally entered the home stretch towards publication later in 1995. IS-41 Rev. C was approved for ballot on March 31, 1995 at a TIA TR-45.2 meeting, however, due to the extensive editing required to incorporate a backlog of approved changes to the baseline version, the ballot will not be ready until May 5, 1995. The ballot period will be 60 days, terminating on July 5, 1995. Following this it will probably take at least the July and August TR-45.2 meetings to review all ballot comments. The edited post-ballot version may be reviewed during the September meeting. Consequently, IS-41 Rev. C will not actually be published until at least October, 1995. Following approval for TIA publication, IS-41 Revision C will be submitted for ANSI approval as a full standard.◇

Change in Fax Delivery

We are changing the way that we deliver fax copies of this news letter. Starting with this issue, a fax broadcast service bureau will be used. We hope that this will result in better service to you. If you experience any problem, such as reduced fax transmission quality, please contact us immediately at 1-800-633-5514.◇

Comments Welcome

We welcome comments on the contents and format of this newsletter, suggestions for future topics, letters, submissions and corrections.

PCS Standardization in TIA Committee TR-46

The status of 1800-2200 MHz PCS standardization is revealed in this report on the TIA TR-46 committee, provided by Miguel Cobo of Ericsson, who chairs TR-46.2 Working Group II. Page 4 lists TR-46 projects and network-related standards.

The TIA TR-46 Committee is responsible for the development of 1800 MHz personal communications services (PCS) standards. TR-46 cooperates with ATIS (Alliance for Telecommunications Industry Solutions) committee T1P1 through a Joint Technical Committee (JTC). Together, these groups define requirements and standards for the emerging 1800 MHz PCS industry. Most of the TR-46 and T1P1 PCS standards are based on existing cellular or wireline telecommunications standards, with adaptations for frequency or market needs.

TR-46 has 3 subcommittees, each focusing on a different area of PCS standardization:

- TR46.1: Services & Network Reference Models
This subcommittee is responsible for developing Stage 1 service descriptions, system requirements, and network reference models. It is chaired by P.J. Louis of Bellcore. TR-46.1 is the front end of the PCS standards development pipeline. It is now revising the IS-104 Service Descriptions standard and modifying the network reference model to include intelligent network and enhanced

mobility concepts. Requirements for lawfully authorized electronic surveillance and emergency services are also being addressed.

- TR46.2: Network Interfaces

This subcommittee is responsible for developing Stage 2 (network perspective) and Stage 3 (implementation perspective) descriptions and network interface signaling standards. It is chaired by Doug Rollender of AT&T.

TR-46.2 is standardizing two different Mobile Application Parts (MAP's):

- DCS 1900 (GSM adapted for North America)
- D-AMPS 1900 (IS-41 with adaptations for the 1800 - 2200 MHz band).

Because these two MAP's are so different, TR46.2 is also constructing a standard that will allow interworking and interoperability.

Two standards for the interface between the PCS Switching Center (PCSC) and the radio sub-system (A-Interface) are also being developed:

- SS7/GSM based
- US National ISDN based.
- TR-46.3: Air Interfaces

The subcommittee responsible for 1800 MHz air interface standards. It is chaired by Tony Akers of Motorola. The 7 air interface standards produced by TR-46.3 and T1P1 through the JTC are now being balloted.

The recent issuance of the first PCS licenses to MTA auction winners will have a profound impact on the standards being pursued. Carriers that already have licenses in other frequency bands may consider leveraging off existing resources, from infrastructure such as towers to their intellectual investment in existing cellular standards. Carriers that are new to the US wireless market may attempt to stand out from the crowd by offering new standards such as GSM.◊

TIA Standard IS-124: Real-Time Call Detail Record Transfer: Part I

The TIA standard IS-124, known as DMH, is a protocol for the near realtime transfer of call detail and billing records. This standard will enable a seamless information transfer network to speed up and enhance billing, fraud detection and other capabilities of the cellular network.

What is DMH?

You are forgiven if you do not know what the acronym DMH stands for or, once you find out that it means *Data Message Handler*, what it has to do with call detail records. The name stuck in the early days of development of the standard when the purpose was fogged with mystery to allow the yet undefined standard to "move any stuff between any things". Carriers were concerned that if the focus was exclusively on billing, that other applications, such as fraud management, would not be considered. The message behind this strategy was successful, as billing, fraud, inter-carrier settlement and auditing were all considered by TIA TR-45.2 Working Group IV that developed the standard.

Call Detail Records and Billing Records

A call detail (aka AMA) record contains essential information about a call, such as called number,

MIN, duration and facility usage. Call records usually do not include price information and have historically been produced in switch-specific formats. In

comparison, billing records contain price information, and are usually exchanged between billing systems using the Cibernet CIBER tape format, a *de facto* standard. IS-124 allows the concept of call detail record and billing record to be merged.

Network Reference Model

Every good standard deserves a network

What is a CDR Good For?

A call detail record (CDR) provides a wealth of detail about a call, especially when correlated with information from other databases. Uses range from the obvious to the exotic:

Billing	This is obvious, right!
Fraud Detection	CDR information can be used to rank the likelihood that a call is fraudulent, based on the location of caller (high fraud zone?), the identity of caller (fraud already suspected?), the destination of the call (drug growing area?), the fit with subscriber's historical usage pattern and even the laws of physics (calls 1 minute apart using the same MIN in different cities).
Realtime Rating	Special real-time rating can be provided for rental phone services.
Marketing	Analysis of subscriber calling patterns can provide carriers with information to reduce churn, sell new features and packages and increase customer satisfaction
Monitoring	Analysis of call problems can reveal subtle deficiencies, degradations or overloads in various parts of the system
Settlement	Calculation of amounts owed between carriers due to interconnect agreements to support call delivery, inter-system handoff etc.
Auditing	Sometimes necessary to verify billing and settlement through checking the information in every pair of records representing the same call at different ends of an interface.

reference model, and IS-124 is no exception. Figure 1 shows the network elements and reference points (interfaces) that connect them. This reference model cannot be easily

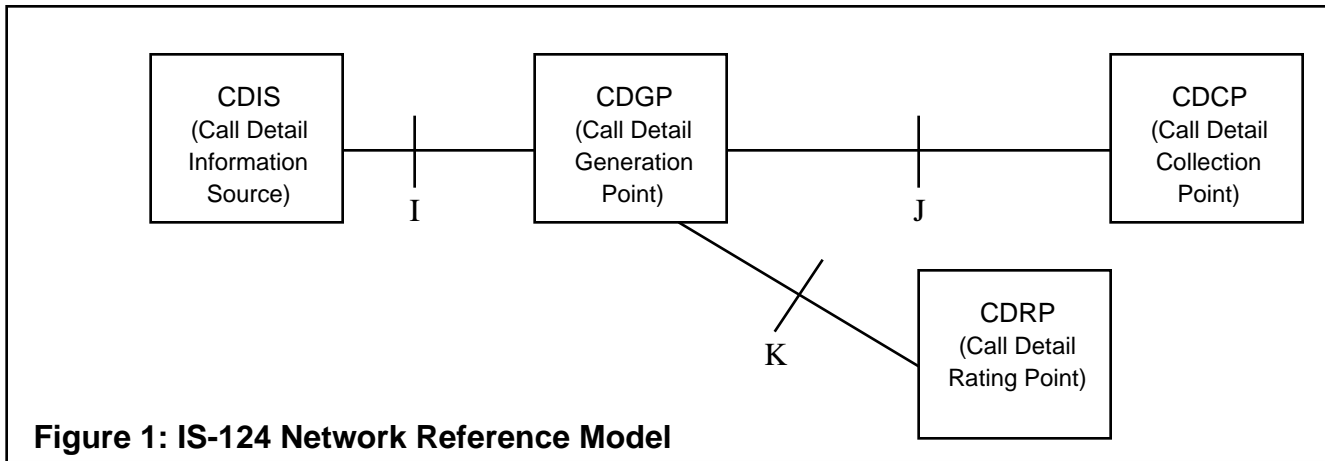


Figure 1: IS-124 Network Reference Model

integrated with the standard TIA TR-45 reference model, as *any* network element in that model can appear as a source of call detail records in the IS-124 model.

Network Elements

CDIS Call Detail Information Source

The initial source of call detail records, in a proprietary format.

CDGP Call Detail Generation Point

The network element that generates call records in the standard IS-124 *DMH* format.

CDRP Call Detail Rating Point

The network element that rates call detail records.

CDCP Call Detail Collection Point

The consumer of call records, front-end to applications such as billing and fraud management.

Reference Points

I CDIS-CDGP

Call detail records in a non-standard, non-IS-124 format.

J CDGP-CDCP

Call records in the standard IS-124 format, possibly including rating information.

K CDGP-CDRP

Transactions to allow call detail records to be rated.

IS-124 ... Continued

In the continuation of this article in our May issue, we will discuss the status of IS-124 implementation, describe some commercial products and services that are available, and discuss the basics of the IS-124 protocol. We will pay particular attention to subsets of IS-124 that are being developed specifically for fraud and billing applications in a joint industry effort.◊

TR-45.2 Standards Update: IS-41 Revision C to be Balloted

TIA subcommittee TR-45.2 has approved IS-41 Rev. C for ballot and IS-52 Rev. A and IS-53 Rev. A are being prepared for ANSI ballot, following successful TIA balloting and imminent publication.

The status of each major outstanding TR-45.2 project is listed below, in approximate order of completion:

Cellular Dialing Plan (IS-52 Rev. A, PN-3166) • In Press. ANSI ballot will occur after one minor change is made.

Subscriber Features (IS-53 Rev. A, PN-2977) • In Press. Following TIA publication, ANSI balloting will begin, after a number of minor changes.

IS-41 Revision C (PN-2991) • Approved for ballot. The ballot period is scheduled to be May 5 to July 5, 1995.

International Applications (TSB-29 Rev. B, PN-3173) •

TR-45.2 WG VI is studying the implementation of E.212 mobile identification, international SS7 global title translation requirements and other issues, for incorporation in TSB-29 Revision B, scheduled for ballot in January, 1996. A new project to document the multiple HLR query (“double-dipping”) solution to MIN ambiguity has been opened.

Online Call Record Transfer (IS-124 Rev. A, PN-3293) •

TR-45.2 is considering revisions to the “DMH” standard for the online transfer of call records for billing, fraud and other purposes. Cibernet is currently sponsoring meetings to develop subsets of the DMH for fraud and billing. Balloting is scheduled for November, 1995.

Subscriber Features (IS-53

Rev. B, PN-3362) • The CTIA list of 9 priority features will form the basis for additions to IS-53. Balloting is scheduled to start in January, 1996.

IS-41 Rev. D • Ballot is scheduled for January, 1996.

Interconnection (IS-93 Rev. A,

PN-3295) • Balloting is scheduled to start in November, 1995.◊

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TIA TR-46 Committee
 Public 1800 MHz PCS
 Project Status Report

*Cellular
 Networking
 Perspectives*

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Published Interim Standards

IS	Title	Published
104-0	PCS Service Descriptions (Features)	05/94

Published Telecommunications Systems Bulletins (TSBs)

TSB	Title	Published

Projects in Ballot Process (SP = Standards Proposal Number)

SP	Title	Editor	IS/TSB
3211	Network Interconnection (based on IS-93)	P.J. Louis	IS-128

Completed Internal Documents

PN	Title	Editor	Completed
3167	System Requirements for 1800 MHz PCS	Stephen Jones	<i>ongoing</i>

Active TR46.1 Projects (PN=TIA Project Number)

PN	Title	Editor	WG IS/TSB
3169	Network Reference Model	Randall Snyder	II <i>internal</i>
3307	A Interface Requirements	Tuevo Jarvela	
3368	System Requirements, Revised	Stephen Jones	I
3369	PCS Service Descriptions, Revision A	Tuevo Jarvela	I IS-104-A
3436	Advanced Network Reference Model (including IN, OA&M)	Randall Snyder	
- - -	Privacy and Authentication Requirements		

Active TR46.2 Projects (PN=TIA Project Number)

PN	Title	Editor	WG IS/TSB
3212	Interoperability between GSM and IS-41 PCS Networks		IS-129
3341	Intersystem Operations - IS-41 MAP based	P.J. Louis	
3342	- DCS 1900 (GSM) MAP based	Eric Figueras	
3343	SS7/GSM A Interface (BS/MSC)	D. O'Neil	
3344	ISDN A Interface (BS/MSC)		

Status of IS-41 Rev. B Implementation

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Vendor1	Vendor2	Status	Date	Type	Location
Alcatel SEL	Astronet*	Commercial	08/94	H V D S	Mobile, Alabama (BellSouth)
	AT&T	Field Trial	03/95	H+V D S	Orlando, Florida (BellSouth)
	EDS PC	Commercial	08/94	V D S	Mobile, Alabama (BellSouth)
	GTE TSI	Commercial	08/94	V D S	Mobile, Alabama (BellSouth)
	Motorola	Commercial	02/95	V D S	Jacksonville, Florida (BellSouth)
		Field Trial	1Q'95	H V D S	Orlando, Florida (BellSouth)
Astronet		Development			
AT&T	Alcatel SEL	Field Trial	03/95	H+V D S	Florida (BellSouth)
	GTE TSI	Planning		V DXS	<i>Location not announced (BAM)</i>
	NEC	Commercial		H V D S	Brazil
	NTI	Planning		H+V DX T	<i>location not announced</i>
Celcore	AT&T	Lab Trial		V DX	St. Louis, Missouri (SWBMS)
EDS PC	Alcatel SEL	Commercial	08/94	V D S	Mobile, Alabama (BellSouth)
	Ericsson	Planning		V X	Location not announced
Ericsson	EDS PC	Planning		V X	<i>location not announced</i>
	Motorola	Field Trial		H V D S	<i>location not announced</i>
	NTI	Planning		H VAD S	<i>location not announced</i>
	NTI*	Commercial		V D S	<i>location not announced</i>
GTE TSI	Alcatel SEL	Commercial	08/94	V D S	Mobile, Alabama (BellSouth)
	AT&T	Lab Trial	TBD	V DXS	<i>Location not announced (BAM)</i>
Motorola	Alcatel SEL	Field Trial	1Q'95	H V D S	Orlando (BellSouth)
	Astronet*	Commercial	4Q'94	V DX	<i>Several locations</i>
	AT&T*	Commercial		V D S	<i>Several locations</i>
	EDS PC*	Commercial		V X	Dedham, MA
	Ericsson*	Commercial		V D S	Piscataway, NJ (Comcast)
	GTE TSI*	Commercial		V DX	Orlando, Florida
	NEC	Commercial		V D S	Brazil
	NTI (MTX)*	Commercial		H V DX	Denver, CO
	NTI(800CM)*	Commercial		V DX	Raleigh, NC
NEC	AT&T	Commercial		H V D S	Brazil
	Motorola	Commercial		V D S	Brazil
NTI	AT&T	Lab Trial	TBD	H V DX	Windsor (Bell Mobility)
	Ericsson	Planning		H VAD S	Ft. Myers (Palmer)
	Motorola	Field Trial	TBD	H V DX	<i>location not announced (Sprint)</i>
Plexsys	GTE TSI*	Planning		V D	
	NTI	Planning		H V D	Tennessee

Explanation: * Other vendor is using IS-41 Rev. A with TSB-55 for compatibility.

Status: Development, Planning, Lab Trial, Field Trial or Commercial.

Date: Date of actual or expected *completion* of listed phase of testing.

Type of test:

- H Includes handoff forward and back
- H+ Also includes path minimization and/or flash handling
- V Includes validation.
- A Includes authentication (TSB-51).
- D Includes call delivery.
- X Uses X.25 datalink protocol.
- S Uses ANSI SS7 datalink protocol.
- C Uses CCITT SS7 datalink protocol.
- T Uses TDMA (IS-54) digital mobiles.
- W Uses CDMA (IS-95) digital mobiles.

Location: Location of test and carrier. Usually listed for first trial only.