In This Issue ...

If in Doubt ... Reorganize  p. 1
Reorganization of the TIA TR-45.2 standards sub-committee.

New Cellular Features: The Lucky 9 for ‘95  p. 1
Carriers have chosen their priority features for IS-53 Rev. B and IS-41 Rev. D.

SMS: Cellular Short Message Service, Part II  p. 2

Guest's Cell: P.J. Louis on Seamlessness  p. 4


If in Doubt ... Reorganize

The TR-45.2 sub-committee has reorganized its working groups to better reflect the 3 stage development process that it adopted some time ago. The new structure is shown in detail in a report on Page 5.

The three stages of standards development are:

I. User Perspective.
   Definition of how individual features should operate from an end-user point of view. This stage is published in IS-53.

II. Network Perspective.
   A logical definition of network transactions required to support all features and capabilities. This stage is published in IS-41 sections 1, 2, 3 and 4.

III. Implementation Perspective.
   A precise definition of the messages, parameters, timers and procedures necessary for all vendors to implement all features in a consistent, compatible and unambiguous fashion. This stage is published in IS-41 sections 5 and 6.

These 3 stages of development are now the responsibility of Working Groups I, II and III, respectively, replacing the groups previously numbered I, II, III and V. No change has been made to the identification or mandate of Working Groups IV, VI and VII.

New Cellular Features: The Lucky 9 for ‘95

Of the 45 features being examined by the TR-45.2 sub-committee for inclusion in IS-53 Revision B and IS-41 Revision D, 9 were recently blessed by the CTIA. The chief technical officers of cellular carriers decided by a voting process that only the following features should be standardized in 1995:

1. Calling Name Identification.
   Display the name of the calling party when a call is received by a cellular phone, instead of the calling phone number.

2. Emergency Services.
   Enhanced 9-1-1 service to provide features such as location determination, callback and priority access.

3. Law Enforcement Intercept.
   Monitoring of calls to or from certain mobiles to meet US legal requirements.

4. Identity Confidentiality.
   Protection of the identity of cellular phones by not transmitting mobile identifying information in the clear across the cellular control channel.

5. Incoming Call Screening.
   Screening of incoming calls to redirect unwanted calls to an announcement or to voice mail.

Next issue due: April 4, 1995
   The ability to control services by voice command.

   More reliable transmission of faxes to and from cellular phones connected to a PC or fax machine.

8. Short Message Delivery - Multi-Point Bearer Service.
   The ability to send one short message to a group of related SMS-capable terminals.

As the CTIA represents most cellular carriers the TR–45.2 sub-committee will take their direction seriously and likely include these features in the development of IS-53 Revision B and IS-41 Revision D. It is unlikely that the remaining services will be standardized at this time, due to the many months of delay completing IS-53 Rev. A and IS-41 Rev. C which incorporated about 20 new features. Some additional features that are already functional will not always be roaming in an autonomous message from the system currently serving the mobile.

**SMS: Cellular Short Message Service, Part II**

In our first issue discussing cellular Short Message Service (SMS) we described the basic network architecture and services. We will complete this two-part series by describing some of the details of its implementation.

**Handoff**

After a mobile has been handed off to a neighbouring MSC, short messages will still be delivered to the MSC that originally handled the call (the “Anchor” MSC). Special IS-41 transactions are required to forward incoming short messages to the terminal or, in the reverse direction, to pass mobile originated messages back to the Anchor.

**Mobile SME Status Monitoring**

If a mobile SME becomes unavailable (e.g. turned off), the Message Center (MC) will stop attempting to transmit short messages to avoid consuming network bandwidth unnecessarily. The mobile status can be determined through a response to a failed message delivery, or in an autonomous message from the system currently serving the mobile.

**Battery Saving Modes**

One of the most serious problems of cellular phones, compared with pagers, is battery life. Newer digital air interface standards, both CDMA (IS-95 Rev. A) and TDMA (IS-136) have attempted to combat this by allowing the phone to receive service while being turned off most of the time. This is a similar technique to that used by pagers, although cellular battery life will likely only be measured in days and not weeks.

**Alternatives to Short Message Service**

Short Message Service will compete with several other methods for delivering similar information, each with unique advantages and disadvantages:

- **Paging**
  - Pagers have the advantages of smaller size, longer battery life and cheaper service. However, they do not have message acknowledgement (yet) nor the functionality of a built-in phone.

- **Voice Paging**
  - ReadyCom of North Carolina has a unique voice paging product based on modifications only to a cellular phone and a voice mail system. It provides a form of sleep mode to extend battery life to about a week and uses compression to deliver voice messages more cheaply to the phone’s message memory.

- **Circuit Data**
  - Increasingly, cellular phones are being used to dial into online services to access email. While messages can be much longer than SMS provides, automatic new message notification is not generally provided.

- **CDPD**
  - CDPD provides similar e-mail capabilities to circuit data, although being based on packet data protocols is more suitable if messages are small and frequent. New message notification makes more sense with CDPD.

SMS will be squeezed in price and functionality between paging and data services. It will appeal to the existing base of cellular phone users rather than moving people away from alternative services.

Slotted Mode in CDMA (and a similar mode in IS-136 TDMA) allows a cellular phone to be on only a fraction of the time, with its awake periods closely synchronized with the base station. The base station can transmit, at the predetermined wakeup time, an indication of whether the mobile should go back to sleep right away, or stay awake to receive some messages that are waiting for it.

Short Messages are one of the most likely reasons for a sleeping phone to awaken. If the phone is asleep for the maximum 2 minute interval in Slotted Mode, delaying incoming calls is out of the question. However, the non-realtime nature of short messages makes them a good candidate for this treatment.

Battery saving modes do have a network impact. The serving system has to remember that a sleeping mobile has outstanding short messages in order to keep it awake at the end of the next period, and the Message Centre should not retransmit messages that failed due to a dozing mobile. Support for Sleep Mode was added late in 1994 to the baseline Short Message specification in IS–41 Rev. C.

CDMA, to add to the confusion, contains an alternative to Slotted Mode, called Sleep Mode, which involves the phone powering itself off for a longer period of time, but needing to completely resynchronize when it awakens. Both modes can be treated alike from an SMS perspective.

**Compatibility**

At least at first, mobiles with SMS capability will not always be roaming in an area with SMS capability. When this is determined, the Message Center should...
turn off message delivery. When the mobile reenters an area that does support SMS, message delivery can be turned back on.

A second compatibility issue concerns both the significant and subtle differences in SMS support in different air interfaces. This will either lead to complex interworking and translation or to support for only the lowest common denominator.

**Air Interface Support**

Short Message Service is not supported by the majority of cellular phones that are currently in service, those that were designed to the EIA/TIA-553 analog specification. Newer phones incorporating modern air interface standards support SMS, although the level of sophistication varies widely:

- **IS-88** This standard defining NAMPS (Narrowband Analog) supports SMS delivery as an option using a restricted alphabet (e.g. upper case letters only) as an optional capability. Many new analog phones and many cellular systems support this standard.

- **IS-91** This new analog standard incorporates NAMPS (IS-88) and thus brings support for SMS as an option to wideband analog cellular phones. Few phones have been built to this standard as it was only published in September 1994.

- **IS-95** Revision A of the CDMA digital cellular standard will support SMS originations and terminations using the full ASCII alphabet. This standard is expected to be published soon.

- **IS-136** This enhanced standard for TDMA digital cellular will provide SMS capabilities similar to IS-95-A on the new digital control channel. This standard was published in January, 1995.

**Roaming Support**

Short Message Service can only be supported seamlessly for roamers when intersystem operations are standardized in IS-41. Revision C of this standard, due for ballot starting March, 1995, will support SMS. IS-53 Revision A, approved for publication but not yet sent to press, contains a description of the cellular Short Message feature.

**Mobility**

Mobility is managed in IS-41 SMS by two mechanisms: location tracking and temporary routing addresses. Location tracking builds off the normal IS-41 registration procedure and was described in the first part of this series. The temporary routing address is analogous to the TLDN used for routing voice calls. This address is local to the system currently serving a roamer but, unlike a TLDN, the SMS temporary routing address can be assigned to the local system, not to individual mobiles, and therefore can be used for multiple transactions.

**Protocol Structure**

Short Message Services messages are transmitted around the cellular network using a multi-layered protocol. Several new messages have been defined using a group of new IS-41 messages. The only bearer service defined in IS-53 Rev. A and IS-41 Rev. C is the Point-to-Point bearer service. In future standards more may be defined:

- **Point-to-Point** This existing bearer service allows for the transmission of a short message from one point in the network to another. This service is defined using a group of new IS-41 messages.

- **Multi-Point** This service would allow one short message to be transmitted to multiple SME’s. This is one of the CTIA priority features for IS–53-B and IS–41-D.

**IS-41 Transactions**

The IS-41 Revision C standard defines several new transactions that support the Point-to-Point bearer service and that carry teleservice information transparently:

- **SMSDeliveryPointToPoint** This transaction carries a short message between a Message Centre (MC) and a Short Message Entity (SME) or between two SME’s.

- **SMSNotification** Notifies an MC that message delivery is either on or off for a particular SME and provides a temporary routing address.

- **SMSRequest** Requests a temporary SMS routing address for a roamer.

- **SMSDeliveryForward** Forwards a short message towards a mobile SME along the inter-system handoff chain from the Anchor MSC to the Serving MSC.

- **SMSDeliveryBackward**

---

See article on Page 1.
Transmits a short message to the Anch-
or MSC from a mobile SME after inter-
system handoff.

Two existing IS-41 transactions have
been modified to better support SMS:

• RegistrationNotification
  This message can convey a temporary
  SMS routing address when a roa-
ming SMS-capable terminal reg-
isters in a new, SMS-capable, sys-
tem.

• RegistrationCancellation
  Indicates whether a message was
  waiting for the mobile SME to come
  available at the time the mobile
  moved to the new system.

Summary

Short Message Service is an important
new capability in the cellular network.
It is one of several new services, vary-
ing widely in functionality, that are try-
ing to meet customer demands for wire-
less data transmission. Whether SMS
has hit the right spot on the price-per-
formance curve will have to be left for
the marketplace to decide.

Guest’s Cell: P.J. Louis on Seamlessness

In this article, P.J. Louis (Chairman
of TIA TR-45.2 Working Group VII
on PSTN/ISDN Interfaces) ponders the
definition of Seamlessness, posing the
question “How can the goals of Seam-
lessness and Product Differentiation
both be fulfilled?”.

Users of wireless phones want
seamless service, where services can
be invoked and operated in the
same way in any network. Seam-
lessness is a service concept that the
wireless telecommunications indus-
try is striving to provide. Users do
not want to spend their time or en-
ergy learning different procedures
to invoke the same feature when-
evitably they move from one system to
another, especially considering that
users do not usually even know
what system they are being served by at any moment.

Regardless of how carriers imple-
ment a service, the user wants to
push the same buttons every time.
Realistically, this is difficult to ac-
complish as long as product differ-
entiation is also an important goal.

Product (service implementation)
differentiation should only be a prob-
lem with users who roam from one
carrier’s system to another carrier’s
system. The more often a user
ravens, the greater the impact on the
subscriber that differences in the
way one carrier provides a service
from another will have.

If the “crystal ball” prophets of the
telecommunications industry are ac-
curate, mobility will grow rapidly,
leading to the day when achieving
and maintaining seamlessness will
pose a greater challenge.

How can seamlessness and product
differentiation both be attained?
That is the question that all wireless
carriers and manufacturers should
be trying to answer.

TR-45.2 Standards Update:
IS-52 Rev. A and IS-53 Rev. A
Available Real Soon Now

TIA subcommittee TR-45.2
has forwarded IS-52 Rev. A
and IS-53 Revision A is following along close behind.
The status of each major outstanding
TR-45.2 project is listed below, in approxi-
mate order of completion:

IS-41 Rev. B Technical Notes
(TSB–41, SP-2985) • Published No-


Cellular Dialing Plan (IS-52 Rev.
A, PN-3166) • In Press. The final ver-
cion of this dialing plan standard was
approved by TR-45.2 on February 24,
1995. This followed several rounds of
post-ballot editing to ensure that all
changes agreed to during ballot review
were correctly incorporated.

Subscriber Features (IS-53
Rev. A, PN-2977) • The pre-publica-
tion version of IS-53 Revision A is un-
dergoing editorial review to ensure that
all approved ballot comments have been
incorporated correctly. It will likely be
approved for forwarding to the TIA for
printing during the March 27-31, 1995
TR-45.2 meeting.

IS-41 Revision C (PN-2991) • This
revision of IS-41 is scheduled for 60
day ballot starting March, 1995. The
document is now in V&V (Verification
& Validation), although not all text is
available, especially for Short Message
Service. Revision C is approximately 5
times as large and complex as Revision
B.

International Applications
(TSB–29 Rev. B, PN-3173) •
TR–45.2 WG VI is studying the imple-
mentation of E.212 mobile identifica-
tion, international SS7 global title trans-
lation requirements, double dipping and
other issues, for incorporation in TSB-
29 Revision B, scheduled for ballot in
January, 1996.

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 pur-
poses. Cibernet is currently sponsoring
meetings to develop subsets of the
DMH for fraud and billing.

Subscriber Features (IS-53 Rev.
B, PN-3362) • The CTIA has proposed
a list of 9 features that cellular carriers
most want in IS-53 Rev. B and IS-41
Rev. D. This proposal will likely be ac-
cepted by TR-45.2. See article on

How to Subscribe

The easiest way to subscribe is to
phone us toll-free at 1-800-633-5514
or fax us at 1-403-289-6658. Tell us
your name, company, mailing ad-
dress, type of delivery (fax or mail),
phone and fax numbers. At your
choice we will invoice you or send
you a form for American Express
payment.
<table>
<thead>
<tr>
<th>WG</th>
<th>TG</th>
<th>Mandate</th>
<th>Chair</th>
<th>PN</th>
<th>Title</th>
<th>Editor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plenary</td>
<td>Cellular System Operations</td>
<td>John Marinho</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cheryl Blum (vice-chair)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Stage I</td>
<td>Development (User Perspective)</td>
<td>Terry Watts</td>
<td>2977</td>
<td>Cellular Features Description (Rev. A)</td>
<td>Terry Watts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(previously WG V)</td>
<td></td>
<td>3362</td>
<td>Cellular Features Description (Rev. B)</td>
<td>Terry Watts</td>
</tr>
<tr>
<td>II</td>
<td>Stage II</td>
<td>Development (Network Perspective)</td>
<td>Cheryl Blum</td>
<td>2991</td>
<td>IS-41 Rev. C</td>
<td>Terry Watts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(previously WG II and III)</td>
<td></td>
<td></td>
<td>IS-41 Rev. D</td>
<td>not assigned</td>
</tr>
<tr>
<td>III</td>
<td>Stage III</td>
<td>Development (Encoding &amp; Procedures)</td>
<td>Charles Ishman</td>
<td>2991</td>
<td>Cellular Radio Telecommunications Inter-system Operations (IS-41-C)</td>
<td>Terry Watts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(previously WG I)</td>
<td></td>
<td></td>
<td>IS-41 Rev. D</td>
<td>not assigned</td>
</tr>
<tr>
<td>I</td>
<td>Fax &amp; Data</td>
<td></td>
<td>Thomas Ginter</td>
<td></td>
<td>Fax &amp; Data over Cellular</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Message Accounting</td>
<td></td>
<td>John Willse</td>
<td>3293</td>
<td>Cellular Inter-System Non-Signaling Data Communications (IS-124-A)</td>
<td>Kirk Carlson</td>
</tr>
<tr>
<td>V</td>
<td>inactive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI</td>
<td>International Applications</td>
<td></td>
<td>David Crowe</td>
<td>3173</td>
<td>International Implementation of Cellular Radiotelephone Systems</td>
<td>Steve Jones</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Compliant with ANSI/EIA/TIA-553 (TSB-29-B)</td>
<td></td>
</tr>
<tr>
<td>VII</td>
<td>Interfaces to Other Telecommunications Networks</td>
<td>P.J. Louis</td>
<td>3295</td>
<td>Ai and Di Interfaces Standard (PSTN/MSC) (IS-93 Rev. A)</td>
<td>not assigned</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- WG - Working Group number (assigned by TIA TR-45.2 sub-committee)
- TG - Task Group number
- PN - Project Number (assigned by the TIA to standards under development)