Inter Carrier Messaging

Feature-Set & Interfaces

Version 3.0

Effective Date: October 11, 2011


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VERSION HISTORY

VERSION	REASON FOR REVISION	DATE
0.1	INITIAL DRAFT	11/02/01
0.5	MODIFIED AND EXPANDED DRAFT	11/13/01
.6	ADDED SPRINT AND CINGULAR INPUT	11/28/01
0.7	ADDED MIDWEST WIRELESS INPUT	1/3/02
0.8	CONSOLIDATED AND EXPANDED DRAFT	1/16/02
0.9	AGREED FEATURE-LIST FROM SAN FRANCISCO MEETING	1/30/02
1.0	FINALIZED VERSION WITH DECISIONS FROM CONFERENCE CALLS	2/22/02
2.0	UPDATES TO EXPAND MESSAGING INTEROPERABILITY TO NON-WIRELESS CARRIERS	1/29/09
3.0	1. CLARIFY GUIDELINES FOR INTEROPERABILITY BETWEEN CMRS (COMMERCIAL MOBILE RADIO SERVICE) NETWORK DEVICES AND NON-CMRS DEVICES AND APPLICATIONS 2. CLARIFY GUIDELINES FOR INTER-CARRIER VENDORS PROVIDING WIRELESS NETWORK INTEROPERABILITY FOR NON-CMRS PROVIDERS OF SMS-INTEROPERABLE DEVICES AND APPLICATIONS	10/11/11

DISTRIBUTION LIST

This document is distributed to the following carriers and their associated contacts as well as their selected Inter Carrier Vendors (ICVs).

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Table of Contents

1 Introduction

1.1 Version 1.0

At the first inter-carrier messaging meeting in Las Vegas on October, 25th 2001 all participating carriers indicated their intent to support inter-carrier messaging. This service enables wireless subscribers to send and receive messages using their phone number (MSISDN/MIN) to and from any wireless network.

Furthermore the participating carriers announced their commitment to participate in the process to work toward achieving inter-carrier messaging.

The following Mission Statement of Inter-carrier messaging service was agreed upon:

Allow phone number addressed mobile-to-mobile text messages across wireless carrier networks in the US.

To achieve this goal, subgroups were formed to address technical implementation options and a commonly defined feature-set based on the definition of the available interfaces.

The objective of the interface and feature-set subgroup was to:

Identify and define the involved interfaces and agree upon as well as specify the supported common feature-set.

1.2 Version 2.0

Inter-carrier Messaging Guidelines Version 2.0 was created to expand inter-carrier messaging by enabling messaging traffic between wireless carriers and non-wireless carriers on SMS-capable devices. As a general principal, non-wireless carriers need to follow the inter-carrier messaging guidelines established by wireless carriers to insure interoperability. However, several unique provisions/recommendations were added to the document to reflect the differences between wireless and non-wireless carriers from the messaging perspective.

The initial Mission Statement was revised to reflect the agreed changes in the scope of the Inter-carrier Messaging Guidelines:

Enable phone number addressed text messages across participating wireless and non-wireless carrier networks in the US

It was expected that only a relatively small number of devices in non-wireless carrier networks initially would be SMS-capable and wireless and non-wireless carriers could develop alternative methods and capabilities for delivering messages to their customers (for example, using text-to-speech conversion).

The focus of this document is on the inter-carrier exchange of SMS messages. The alternative methods can be pursued at any time and fall outside the scope this agreement.

1.3 Version 3.0

Version 3.0 is created to facilitate the entrance of non-CMRS devices and services that use 10-digit Telephone Numbers ("TN's") to exchange SMS messages with CMRS-based wireless devices. In order to protect wireless customers from unwanted messages and spam, as well as combat commercial messages that do not comply with the Telephone Consumer Protection Act ("TCPA")[1] and the CAN SPAM Act,[2] this Version 3.0 addresses the spam risks associated with expanded SMS interoperability.

With the advent of non-CMRS devices and services intended to interoperate via SMS with CMRS-based wireless devices, there are three areas where the spam risks of non-CMRS interoperability are addressed more fully:

1. Clarifications to Sections 4 and 6 of the *CTIA Inter Carrier Messaging* document of January 29, 2009.
2. Development of guidelines for inter-carrier vendors (ICVs) providing service to non-CMRS entities interoperating with CMRS-based devices.
3. Development of guidelines for non-CMRS entities providing services and devices that interoperate with CMRS-based SMS devices.

The following table illustrates the relationships among CMRS-based messaging and non-network-affiliated messaging for A2P and P2P traffic types.

	CMRS	Non-CMRS
Application-to-Person	**Supported via Common Short Code***	**Supported via Common Short Code***
Person-to-Person	**Supported since V1.0**	**Defined in V3.0**

*Information related to Common Short Codes may be found at www.USShortCodes.com

2 Interfaces

There are several different options available to interconnect the various carriers and service providers to enable the interoperability.

Three interconnection scenarios have been identified:
1) every carrier and service provider independently selects an ICV to act as its message transfer point;
2) all carriers and service providers select a single ICV or industry association to provide interoperability;

[1] 47 U.S.C. 227.
[2] 15 U.S.C. 7701, et seq.

3) carriers and service providers interconnect their networks directly based on bilateral agreements.

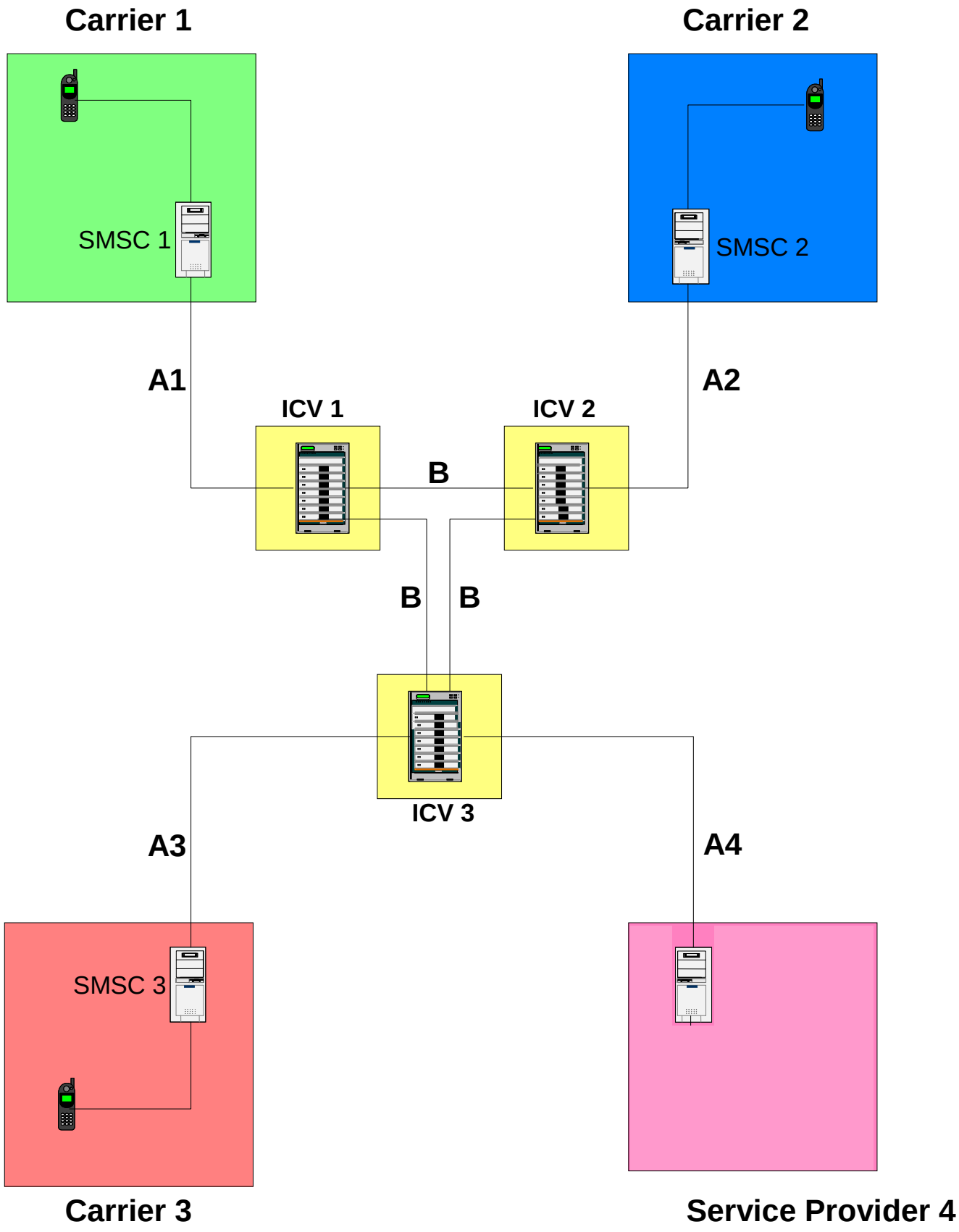
These scenarios are not mutually exclusive. However, since the definition of the interface in case 3) is left to the participating service providers, this document only focuses on cases 1) and 2).

Furthermore this document doesn't discuss any network specific, internal interfaces (e.g. features on the air-interface, etc.) that do not impact the available feature-set.

The following diagram shows four different carriers and service providers each with a device and a messaging service center (SMSC – Short Message Service Center) as well as three independent ICVs acting as message transfer gateways.

In general, there are two different main interfaces available. The A interfaces describe the connection and feature-set between a carrier or service provider and an ICV. Interfaces B describe the connection and feature-set between two ICVs. If there is just one common ICV interface, B is non-existent.

Since each carrier or service provider can have a different feature set between their network and the ICV, they are indexed with different numbers (A1, A2, A3 and A4).


Carrier 1
Carrier 2
SMSC 1
SMSC 2
A1
A2
ICV 1
ICV 2
B
B
B
ICV 3
A3
A4
SMSC 3
Carrier 3
Service Provider 4

3 General Approach

In general, there are two different approaches to define the common feature set for the inter carrier messaging service:

a.) Define the lowest common denominator among all carriers and service providers;
b.) Define the feature set for each carrier and service provider and messaging limits based on the Originating and Terminating carrier and service provider relationship (A1 to A2, A2 to A3 and A1 to A3)

The following illustration illustrates the differences between those approaches as well as their pros and cons.

Each carrier and service provider supports a unique, defined feature-set A (A1, A2 or A3).

In case a.) (lowest common denominator) the feature-set would be limited to the cut set of all involved carriers and service providers. This would relate to the white area B below.

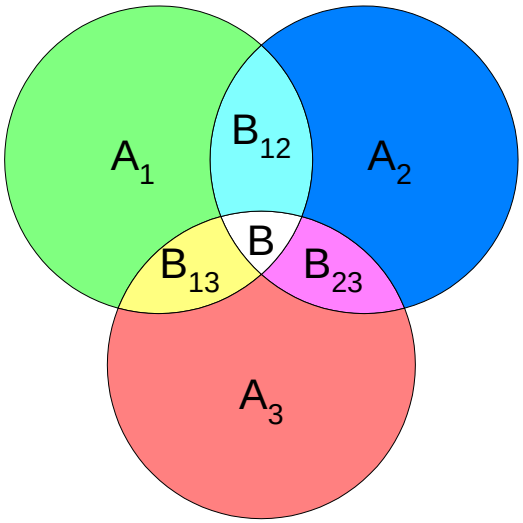
In this approach the ICV has to support the minimal feature-set on interface B and the carrier or service provider-specific feature set on interface A. The limitation of the feature-set would occur at the ICV of the originating side.

With this prerequisite, any ICV that supports any of the A interfaces is able to support interoperability.

In case b.) the feature-set would be limited to the cut set of the Originating and Terminating carrier or service providers. This feature set is reflected in the white area B plus one of the colored areas B12, B13 or B23 depending on the involved parties.

In this approach, the ICV has to support an overall feature-set of any carrier or service provider on the interface B. The limitation of the feature-set would take place at the ICV of the terminating side.

This scenario allows only ICVs supporting all A interfaces to support inter-carrier messaging.



The lowest common denominator approach (a) has the following pros and cons:

Pros:

+ Higher number of ICVs available
+ Additional joining carriers and service providers only have to fulfill interface B recommendations

Cons:

- all carriers and service providers are restricted to the limited feature set
- limited user experience
- Any ICV can enter the business without supporting all carrier and service provider features

The highest common denominator approach (b) has the following pros and cons

Pros:

+ Originating carrier and service provider is only restricted to the feature-set of the receiving carrier and service provider
+ Optimal feature set for a richer user experience
+ Only ICVs that can comply with all carrier and service providers features can participate

Cons:

- Additional joining carriers and service providers can't introduce new features that are not supported by the participating ICVs
- Number of available ICVs is probably lower

4 List of features for B interface

In case of more than one ICV being involved in the end-to-end delivery path, all carriers and service providers are interested in maintaining an agreed minimum set of features for the B interfaces.

To provide maximum flexibility for all service providers, it is possible to extend the feature set for specific bilateral scenarios. This ensures the best available user experience.

In every case as much information/features as possible shall be included along the delivery path and the terminating ICV shall then modify the message according to the capabilities of the receiving network.

4.1 General Recommendations

The inter-carrier messaging-service is limited to phone number addressed mobile-to-mobile, mobile-to/from-non wireless device/service text messages across service provider networks in the US.

The "highest common denominator" approach (as described in Section 3, General Approach) shall be used. In every case, as much information/features as possible shall be included along the delivery path and the terminating ICV shall then modify the message according to the receiving network/device capabilities.

4.2 CMRS and non-CMRS-based SMS-capable Devices or Application

These recommendations apply to regular 10-digit dialable telephone numbers and expressly exclude A2P campaigns. It is recommended that A2P traffic utilize messaging channels established to support Common Short Codes (www.USShortCodes.com). To minimize spam and other messages that do not meet customer expectations, every non-CMRS-based SMS-capable device or service that is intended to send and receive messages to/from CMRS-based SMS-capable devices should comply with the following provisions:

4.2.1 Unique, Static TN

Each device or application shall have a unique, static telephone number that complies with NANP (North American Numbering Plan) requirements. However, a group of multiple devices within a single household or business may be assigned a single static telephone number.

4.2.2 Authentication and Registration

Device or application access shall include authentication and registration in the respective carrier network or service provider.

4.2.3 Single end-user control

Device or application shall allow only single user, household, or end-user business control to ensure person-to-person communication.

4.2.4 No Automated Message Generation

Device or application must not allow the automated origination of messages. Messages must be manually entered and have capabilities in place to protect against automating of bulk sending of messages, except that messages may be individually forwarded from another device or application at the users request. Attributes of messages from the device or application shall be consistent with typical human operation as follows:

4.2.4.1 Throughput

Throughput from a device or service shall be limited by typical human operation and shall be comparable to the throughput rates originated on wireless handsets.

4.2.4.2 Message Volume

Message volume from the device or application shall be comparable to message volume generated by typical human operation on wireless handsets.

4.2.4.3 Quantity of Distinct Recipients

The quantity of distinct recipients of messages from the device or application shall be comparable to the quantity of typical human-generated messaging recipients.

4.2.5 Carrier Integration

Carrier may offer a direct integration to service provider or may hire a third party to handle the connection with 10-digit Service Provider. To insure impartiality, to be able to serve as a 10-digit aggregator, vendor is restricted from providing 10-digit services.

4.2.6 Unique Service Provider Identifier

For routing of messages across networks, each service provider must have a unique, transparent and authenticatable identifier associated with all messaging traffic.

4.2.7 Ensure Opt-In/Opt-Out

Carrier or an ICV acting on behalf of a service provider shall operate an Opt-In/Opt-Out process for service providers' subscribers as described in Section 6 for ICVs. With this process, a subscriber is required to send a mobile originated message with the word "START" to Opt-In and start receiving messages from a service provider.

Opt-In

Opt-In shall be per service and shall allow traffic from all TNs associated with the service.

Except as described in section 4.2.8, messages to users who have not opted-in shall not be allowed, protecting customers from unwanted messages and SPAM.

Service providers, at their own discretion, may allow a one-time, bulk provisioning for existing services migrated to the 10-digit plan for subscribers who have already opted-in using existing procedures, so users are not requested to opt-in to the same program twice. After that time, new customers joining the program will need to initiate the interaction by sending a SMS message from their device with the word "START".

Opt-Out
A subscriber must be able to stop participating and receiving messages from any service by sending a "STOP" command to the TN used for that service.

In the case a TN range is associated with the service, a "STOP" command shall terminate traffic from whole range of TNs provisioned to a service. Service Provider/Carrier may send a one-time confirmation message before terminating traffic.

4.2.8 Invitation to join a service

Carrier may allow Service Providers to send a one-time invitation to non-subscribed customers to join a service. Invitation shall require the user to Opt-In to receive service messages. Invitations shall only be sent to a TN associated with the service and obtained through service provider's processes. If the user has not replied to the invitation or has replied with "STOP", it shall be assumed the customer has opted-out and no additional messages or invitations are allowed, protecting customers from unwanted messages and SPAM. Any response to invitation other than "START" or "STOP" shall be treated as "HELP".

4.2.9 Process Telephone Number Deactivations

Service Providers who join the program shall agree to process TN deactivation information.

Carriers may choose to share Deactivation TN Lists with Service Providers.

Receiving Deactivation Lists may require individual agreements with Carriers to preserve confidentiality.

The TN Deactivation Notification shall be delivered in a format to be determined by Carriers.

Deactivations shall be processed as soon as possible, but in no event more than twenty-four (24) hours after delivery of the Deactivation Notification, Service Provider shall: (i) update its systems to bar all deactivated TN's listed in the

Deactivation Notification from being sent Messages, and (ii) the status of all deactivated TN's listed on the Deactivation Notification will be changed from "Subscriber" to "Deactivated."

Service providers shall ensure that Deactivated TN's do not receive Messages unless and until Service Provider receives a new opt-in message from the Subscriber to which any Deactivated TN has been reassigned, as described in the MMA Best Practices Guidelines. A deactivated TN shall be removed from an invitation list unless it is newly associated with a service.

4.2.10 Help command

The TN being used for messaging must respond to HELP messages and provide the name of the program, offer opt-out commands, and a customer support number within the message body.

4.2.11 Compliance with other MMA CBP requirements

Procedures used by a group member to join, modify or quit a group shall comply with the current version of the Mobile Marketing Association's *Consumer Best Practices*. Compliance includes obtaining and retaining appropriate opt-in notifications and honoring all opt-out notifications. Consumers must always be permitted to opt-out of any group or message service at their discretion.

These guidelines govern messages originated by or associated with a MSISDN/MIN or TN. When a MSISDN/MIN or TN is used to deliver SMS messages to the ICVs or directly to destination carriers, the throughput will always be limited by the destination carrier's throughput volume.

It is strongly recommended that carriers, service providers, and ICV's all follow the guidelines outlined in section 4.4 (SPAM) to ensure good operating practice and protect their customer experience

4.3 Non-CMRS-based SMS-capable Group Messaging Applications

In addition to complying with Section 0 above, Non-CMRS-based SMS-capable Group Messaging Applications are subject to the following additional guidelines:

4.3.1 Group size

The maximum recommended group size per TN is forty (40).

4.3.2 "Pyramid" or Recursive Groups

"Pyramid," "recursive," or "nesting" structure, in which a group could be made a member of one or more additional groups, is not permitted. Note, however that a single TN may be a member of more than one group.

4.3.3 Initial Invitation

Invitations sent by a group messaging application may only be sent by the individual initiating the group, and are limited to a single message to any invitation recipient with opt-in required by the invitation recipient prior to any subsequent messaging.

4.4 Spam

To address concerns about the possibility of Spam and other unwelcome messages degrading the customer experience, the inter-carrier messaging service is limited to:

- **mobile-to-mobile text messages across wireless carrier networks using NANP**
- **mobile to/from non-wireless text messages across wireless and non-wireless carrier networks using NANP**

Therefore, messages are only allowed from/to wireless handset with MSISDN/MIN and non-wireless device with TN's within the NPA-NXX range of any participating carrier or service provider.

Messages from other sources shall not be permitted. This includes any 3rd party application provider being connected to any carrier's SMSC (e.g. ring tone and picture messaging provider, business applications etc.), any other messaging web interface (http), wireless Internet gateway (email) or any other type of device that does not comply with the recommendations stated in Section 4.2.

Prevention of Spam via messaging services should be no different from the anti-spam measures applied to inter-carrier messaging. Recognizing that it is possible for users to send unsolicited commercial messages to other customers, service providers should enable all messages to be clearly mapped to the sending subscriber; accordingly, subscribers who send unsolicited or unwelcome messages can be contacted regarding their activities and unsolicited messaging and when justified, be subject to repercussions up to and including disconnection, and actions pursuant to law seeking money damages and injunctive relief where appropriate. Furthermore, ICVs should be capable of providing mechanisms to control message flow per carrier / subscriber and also allow blacklisting of certain MSISDN/MIN, TN or NPA-NXX ranges at a carrier or service provider's request.

If service providers limit the use of the inter-carrier service to person-to-person traffic and the ICVs filter / block unsolicited messages on a subscriber basis, the Spam risk should be reduced to a level that meets customer expectations.

4.4.1 Spam Controls

Carrier or a vendor hired on its behalf may implement robust spam controls to protect consumers from unwanted messages and Spam. It is recommended that all

service providers adopt or implement similar spam controls to address spam risks associated with expanded SMS interoperability.

4.4.2 Process for Spam identification and containment

A process to collect data shall be established to facilitate spam identification and containment. The process will be accessible to all participating service providers and carriers. The goal of this process is to reduce or eliminate spam threats to consumers. This process in established to protect consumers from unwanted messages and spam, as well as combat commercial messages that do not comply with the Telephone Consumer Protection Act ("TCPA") and the CAN SPAM Act.

4.5 Protocols

There are various protocol types used in the industry for messaging application and for interfacing between different messaging entities.
Most commonly used are:

- SMPP (Logica)
  http://www.smsforum.net

- EMI/UCP (CMG)
  http://madism.org/~madcoder/tmp/EMI-UCP4.6.pdf

- SMS2000/OIS (Sema)
  http://www.kannel.org/download/1.4.0/userguide-1.4.0/userguide.html

- SNPP
  http://www.faqs.org/rfcs/rfc1861.html

Depending on the service providers' network infrastructure and technology a certain protocol might be preferred.

All participating carriers agreed for SMPP to be preferred protocol for the inter-carrier messaging service. SMPP version 3.4 shall be supported as a minimum recommendation. Future versions of SMPP are allowed as long as they are backwards compatible to SMPP version 3.4**.**

4.6 Character set

Different network technologies and service centers might use different character sets. The ICV should be capable of matching one set to another to ensure a readable message.
The supported character sets are ASCII and GSM 7-bit (according to GSM 03.40). Carrier-originated messages can be sent in either of the character-sets. The terminating ICV reformats the message accordingly to match the supported character-set of the receiving carrier. Not supported characters shall be presented as an underscore "_".

The table in Appendix C shall be used for mapping ASCII to GSM 7-bit.

4.7 Message addressing

The destination and origination address is available in different formats depending on the carrier. Supported formats are 10-, 11-, or international E.164 format. To ensure correct routing and reply mechanisms the ICV on the terminating side shall adapt the format accordingly.

4.8 Messages length / Concatenated messages

The maximum message length varies by the service provider network [and user device]. Segmentation might be necessary to adapt message length according to the networks' capabilities.
Each service provider can determine the format of a segmented message separately. It is recommended to append an identifier or order reference to the message.
The terminating entity is responsible to segment the incoming message if the terminating carrier is limited in message length. Concatenated messages on the originating side shall be put into a single SMPP message by the originating entity.
The transmission of any message between an originating carrier and its ICV as well as between ICV's shall always be done as one message.

4.9 Distribution list

In case the originating service provider supports distribution lists it is the responsibility of the originating entity to separate the originated message into individual messages with a single recipient.
In case of more than one ICV in the delivery chain, only messages that can be delivered from a specific ICV are allowed to be forwarded to that ICV, e.g. a message from AT&T to recipients in T-Mobile and Verizon has to be split up by AT&T's ICV if T-Mobile and Verizon aren't connected to the same ICV.

4.10 Validity period

The validity period for the inter-carrier messaging service shall be at least 72 hours in the terminating SMSC. The validity period for all involved ICV's shall be also at least 72 hours. The maximum validity period can be determined by each store and forward entity.

4.11 Reply address

The reply address of an incoming message shall be automatically set to the originating address of the original message by the terminating ICV. The number format shall be formatted according to the address formats specified in "Message Addressing"

4.12 Call Back number

The Call Back number feature, which allows the recipient to place a voice call to the originator of the message, varies by network and device, and therefore this feature is optional. Thus, if the originating carrier populates the specific parameter there is no recommendation for the

terminating carrier to pass that information to the end user. The originating carrier might choose to include the call-back number as a part of the text message itself.

4.13 Binary Data or special User Data

The initial effort focuses on text messaging only. Therefore the originating entity is only allowed to send messages containing human readable text.

4.14 Priority

The priority feature is defined differently for most messaging services. Therefore a matching of the available levels has to be performed by the terminating ICV. Even if all priority levels might be allowed / possible on the originating network, there is no guarantee that it is supported on the terminating network. The formatting / matching of priority levels between the originating network and terminating network is the responsibility of the terminating entity.

4.15 Delete/Replace in SMSC

This feature, which allows the originator to replace or delete previously sent messages that haven't yet been delivered to the final destination, is not supported.

4.16 Delivery receipt / Error Messages / Status reports

If the same SMSC is not used for origination and termination, network implemented delivery and status reports may not be supportable by all carriers. Furthermore additional error messages must be supported and be capable of delivery to the end-user.

The high level recommendation for the inter-carrier messaging service is to ensure availability of an end-to-end delivery receipt mechanism, so that the originating subscriber and carrier can be informed when and if the message has been transmitted successfully to the receiving device. This includes the case where more than one ICV is involved in the delivery chain. Furthermore the delivery report might be required for billing purposes.

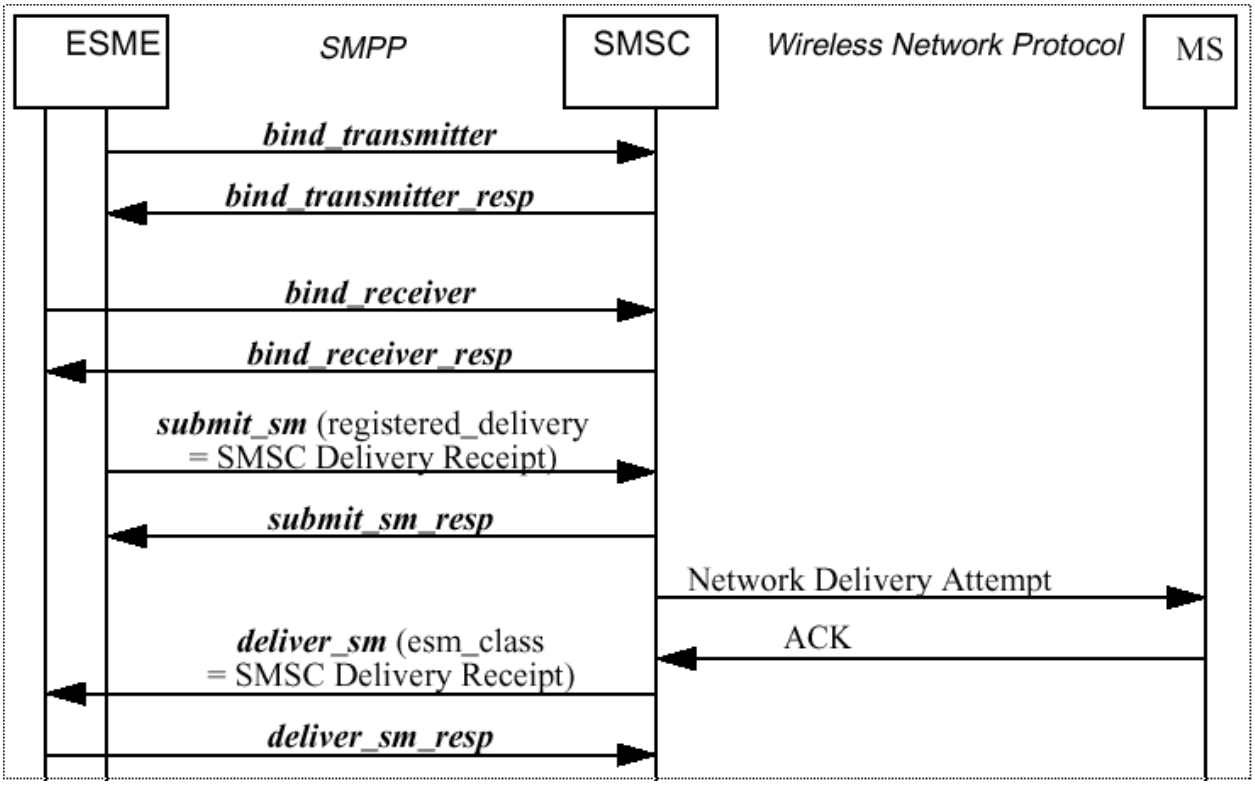
Different technical restrictions bring up some barriers for an end-to-end delivery receipt. Therefore the support for SMSC Delivery Receipt and SME Delivery Acknowledgment is optional for all involved service providers and ICVs.

The remaining part of the chapter describes the implementation of a delivery receipt on a general level.

3.1.1 General SMPP capabilities

The SMPP protocol specification describes the following scenarios:

In general, SMPP protocols supports three message modes, of which two work with some kind of receipt (acknowledgement of final delivery). These are the “Store and Forward Message Mode” and the “Transaction Message Mode”. Both scenarios describe a mobile terminated message coming from the ESME being connected via SMPP to an SMSC.
It is assumed that only the “Store and Forward Message Mode” is used for the inter-carrier messaging service.



Typical SMPP sequence for a registered store and forward message (from SMPP 3.4, Version 1.2 page 31)

The standard doesn’t describe the carrier-originating scenario specifically and it might look different for different network types. It is basically the reverse path with differences in the delivery receipt handling (see example for GSM in T-Mobile’s section in Appendix A)

Furthermore three specific message types are defined for Delivery receipts, notifications and acknowledgements. Not all of them are supported on all network types or SMSC implementations.
See below for quote from SMPP specification 3.4, Version 1.2 pages 34/35

_____Start quote_____

SMPP Specification 3.4. – Message Types Quote

In addition to “normal” short messages, special messages can be transferred between ESME

and the SMSC in a ***submit_sm, deliver_sm*** or a ***data_sm*** operation. The message type is defined in the *esm_class* parameter of the above SMPP operations.
The following message types are supported in SMPP:

SMSC Delivery Receipt
This message type is used to carry an SMSC delivery receipt. The SMSC, on detecting the final state of a registered message stored in the SMSC, should generate a receipt message addressed to the originator of the message. The SMSC Delivery Receipt is carried as the user data payload in the SMPP ***deliver_sm*** or ***data_sm*** operation.
The following fields are relevant in the ***deliver_sm*** and ***data_sm*** operations when used for transmitting delivery receipts.

- source address (i.e. *source_addr_ton, source_addr_npi, source_addr*)
  The source address will be taken from the destination address of the original short message which generated the delivery receipt.
- destination address (i.e. *dest_addr_ton, dest_addr_npi, destination_addr*)
- The destination address will be taken from the source address of the original short message which generated the delivery receipt.
- *esm_class*
- *message_state*
- *network_error_code*
- *receipted_message_id*

Intermediate Notification
An intermediate notification is a special form of message that the SMSC may send to an ESME for a device terminated message delivery. It provides an intermediate status of a message delivery attempt.
Typical uses are

- to provide a "memory capacity exceeded" notification to a Voice Mail System.
- to report the outcome of the first delivery attempt that has failed but the message is still held in the SMSC for further delivery attempts.

Support for Intermediate Notification functionality is specific to the SMSC implementation and the SMSC Service Provider and is beyond the scope of this specification.

SME Delivery Acknowledgement
Despite its name, an SME Delivery Acknowledgement is not an indication that the short message has arrived at the SME, but rather an indication from the recipient SME that the user has read the short message. For a device-based SME, an SME Delivery Acknowledgement is sent when the user or device application has read the message from the SMS storage unit (e.g. SIM card).
Note: The SME Delivery Acknowledgement function may not be supported on all network types.

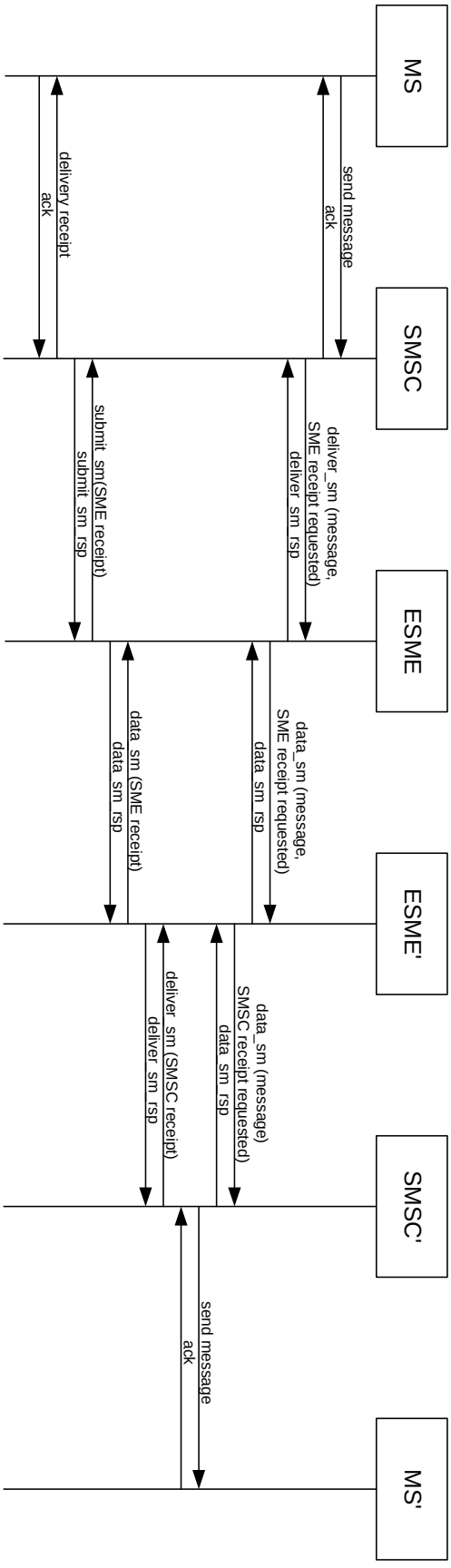
_____end quote_____

The request and delivery of a receipt, notification or acknowledgement is controlled with the parameters "esm_class", "registered_delivery" and contains additional information in the fields "network_error_code", "message_state" and "receipted_message_id".

Based on those features and commands an end-to-end delivery notification can be achieved. However this is contingent on all involved ESMEs and SMSCs supporting the request and

generation of the SME Delivery Acknowledgement or SMSC Delivery receipts as well as the mapping of messages IDs between the different SMPP links by the ICV.

The figure on the next pages shows the general call flow based on SMPP for an originating to terminating service provider message via 2 ESMEs.


MS
SMSC
ESME
ESME'
SMSC'
MS'
send message
ack
delivery receipt
ack
deliver_sm (message,
SME receipt requested)
deliver_sm_rsp
submit_sm(SME receipt)
submit_sm_rsp
data_sm (message,
SME receipt requested)
data_sm_rsp
data_sm (SME receipt)
data_sm_rsp
data_sm (message)
SMSC receipt requested)
data_sm_rsp
deliver_sm (SMSC receipt)
deliver_sm_rsp
send message
ack

5 Interworking between inter-carrier vendors

5.1 Maximum number of Interworking ICVs

To ensure maximum reliability and transparency for all parties, it is recommended that no more than two ICVs be involved in the end-to-end delivery chain. In an effort to maximize consumer satisfaction, each ICV must be compliant with all terms of these guidelines.

5.2 Defining responsibilities via SLAs

In the case of more than one ICV being involved in the end-to-end delivery chain, it is desirable to define clear responsibilities for all involved parties to establish an efficient problem resolution process.

The delivery chain (with two ICVs) can be divided into 5 different areas.

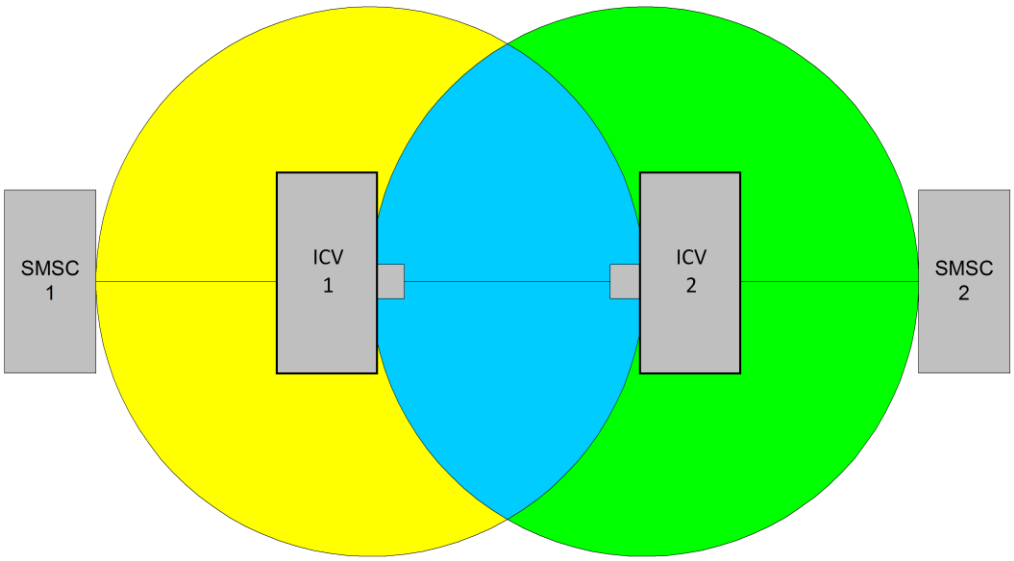
1. Carrier-originated device to Carrier-originated SMSC
2. Carrier-originated SMSC to Originating Carrier ICV
3. Originating Carrier ICV to Terminating Carrier ICV
4. Terminating Carrier ICV to Terminating Carrier SMSC
5. Terminating Carrier SMSC to Terminating Carrier device

For illustrative purposes these delivery chains presents a carrier-to-carrier arrangement; however there are circumstances when service providers could be substituted to either end of the diagram.

Areas 1, 2, 4, 5 are fully in control by the originating and terminating carrier and their relationship to their ICV's. SLAs between them ensure a defined level of availability.

In case of interface 3, the ICVs shall deliver all compliant messages across their interfaces. Therefore it is recommended that an SLA between a service provider and an ICV include as the ICV's obligation the responsibility for any ICV-to-ICV connections, but leave to each ICV the decision to subcontract that obligation to someone else (*e.g*. the other ICV). Under this scenario, the ICV's collectively are responsible for supporting interconnecting links that meet or exceed the SLA requirements. Figure 5.1 depicts this relationship.

Figure 5.1
Circles depict extension of SLAs to include ICV-to-ICV Links



6 Interworking between carriers and service providers

6.1 Delivery of SMS to non-wireless and verified devices and applications.

While essentially 100% of CMRS handsets can receive and send SMS messages, the ability of non-CMRS TNs to receive or send SMS messages is still developing. This uncertainty around the SMS capabilities of non-CMRS devices and services potentially presents a problem when only a small number of SMS messages addressed to non-CMRS TNs can be successfully delivered.

Carriers and service providers may choose different approaches to deal with the above-mentioned challenge. Some may decide to follow the approach implemented today in the wireless ecosystem, in which case the existing wireless inter-carrier infrastructure would be used. Based on this approach, the message destination is determined at the carrier level during the message routing procedure and there is no verification of SMS capability of the terminating device. Wireless carriers may select this approach for several reasons including: relying on the expectation that non-wireless carriers will deliver all messages, even to customers with non-SMS capable devices by some alternative means; or because it provides a simple implementation option.

Where no verification of the SMS capability of the terminating device is obtained, the message will follow one of two different scenarios.

1) In some cases, the message with be converted from text to voice and delivered to the terminating device as a voice message.
2) In other cases, the message is simply dropped when it cannot be delivered to the terminating device.

6.2 Additional SLA Recommendations for ICVs

Additional SLA recommendations for ICVs directed at containing spam and fraud should be considered with the entry of non-CMRS participants into the ecosystem. ICVs offering services to non-CMRS SMS service providers should comply with the following guidelines:

6.2.1 Compliance with Section 4 of these Guidelines

ICVs should insure that each non-CMRS provider meet or exceed all of the recommendations in Section 4 of the *Guidelines* and document how their non-CMRS customers meet these recommendations.

6.2.2 SPAM identification and containment

ICVs must monitor throughput using accepted anti-SPAM methods used for all P2P messaging. If abuse of these recommendations is found, then the ICV should block the offending messages and where appropriate, seek legal recourse against the originator of the message. ICVs should also utilize existing reporting structures to notify the industry of customers sending Spam messages.

6.2.3 Opt-in and Opt-out

ICV acting on behalf of its service providers shall operate an Opt-In/Opt-Out process for service providers' subscribers as described in Section 4. With this process, a subscriber is required to send a mobile originated message with the word "START" to Opt-In and start receiving messages from a service provider.

6.2.4 Unique/transparent identity

ICVs must confirm that all service providers shall be uniquely and transparently identified in all reporting and messaging tracking that is visible to any other service provider. Currently, in some cases, the higher level CLEC name is shown rather than the end-customer (non-CMRS). ICVs must verify that they can identify and if necessary block traffic from individual service providers. Carriers may require ICVs to identify and block certain service providers and services that are sending unacceptable amounts of Spam and unwanted messages to their customers.

6.2.5 International

ICV's may connect international service providers into the ecosystem, to interoperate with US service providers as long as the international service provider complies with all the recommendations set forth in these guidelines. Likewise, the reverse is true: +1 non-CMRS providers may connect with non +1 carriers, as long as the +1 non-CMRS provider complies with all of the recommendations herein.

6.2.6 Traffic binds

Inter-carrier traffic binds shall not be leveraged or used to carry traffic for which they were not originally intended. This includes all non-CMRS providers, long codes, 500 code numbers (e.g. details below) or any other traffic not routed between two CMRS entities which is being routed by ICV. Traffic not intended as traditional inter-carrier traffic may be subject to an additional agreement between the participating entities and be carried via separate connections/binds. Absent the specific agreement of both service providers, messaging traffic between Non-CMRS and CMRS service providers shall not be intermingled with intercarrier traffic.

Area codes 500, 522, 533, 544, 566, 577, 588 are non-geographical area codes reserved for Personal Communication Services. These are special purpose telephone numbers with a set of capabilities that allow service profile management. (www.nanpa.com/number_resource_info/500_codes.html.)

6.2.7 Traffic differentiation

For routing of messages across networks, each service provider must have a unique, transparent and authenticatable identifier associated with all messaging traffic.

6.2.8 Traffic routing

Message traffic destined to a particular CMRS carrier shall contain MSISDN's/MDN's that reside on the carrier's network. Under no circumstances should message traffic be delivered to a CMRS carrier to be passed through to another CMRS carrier without the specific agreement of both service providers.

7 Service Level Agreement

In addition to the recommendations in this document, a service provider may opt to establish Service Level Agreements (SLA) with another service provider / ICV. Each service provider has ultimate accountability for defining roles of responsibilities for performance, maintenance and levels of support. It is also understood that provisioning and enforcement of an SLA is typically at the sole discretion of the carrier.

8 Testing

In order to maintain a certain service level for the end-to-end service testing is necessary whenever a new service provider joins the inter-carrier messaging community. CTIA will maintain a testing document that will serve as a guideline or baseline for this testing. Each carrier/ICV will be responsible for their testing and therefore responsible for updating the document to meets their needs. The testing of each new carrier shall include end-to-end testing to the other carriers as well as internal tests on the system level between the carrier and his ICV. Once a new service provider becomes ready to test, contact information as well as timeline/dates shall be sent to CTIA. CTIA will then facilitate the dissemination of contact information and send the announcement out to the carrier group. It is up to the new service provider to contact potential testing partners.

In general, each service provider is responsible for level 1 and 2 testing as well as troubleshooting together with its ICV. Any remaining issues have to be resolved by the "new" carrier with the terminating carrier and the involved ICVs.

Testing results or problem solutions that might affect QOS and thus be valuable to other carriers or ICV's should be disclosed to interested service providers. Each service provider, working with their selected ICV, is responsible for determining which test results or problem solutions will be disclosed.

9 Appendix A: Supported Features on A interfaces

This section lists each carriers supported feature-set as it was provided by the carrier.

9.1 AT&T

Note : This table applies to SMPP formats, encoding, and parameters for traffic between ICVs. Connections to non-ESMEs may have different capabilities.

Item	Subject	GSM Supports
1	Message Type	Text only
2	Subscribers Provisioned for 2 Way	Customers may opt out of SMS
3	Handsets Support 2 Way	All handsets support 2 way messaging
	SMPP Version	3.4
	SMPP PDUs allowed	Submit_sm, deliver_sm, bind_transmitter, bind_receiver, enquire_link and responses
4	SMSC Provided by	Multiple vendors
5	Character Set	ISO 8859-1 (Latin1) for ICV/ESMEs. SMSC maps to 7 bit GSM + extension characters. UCS2 is allowed and passed through to the Device. Mapping provided on request.
6	Message Header	Not supported
7	Message Length	160 7 bit characters or 70 USC2 characters
8	Concatenated Messages	Not supported
9	Addressing Convention for Mobile to Mobile	11 & E164 digit address for MO & MT
10	Validity Period	5 minutes up to 3 days
11	Message Indicators for Message Types	Not supported
12	Delete/Replace in SMSC	Not supported
13	Short Message Urgent Flag and Auto Display	Not supported
14	Error Message	Not supported
15	Differing Error Messages on SMSC	SMSC will return temporary or permanent errors to ICV in the submit_sm_resp
16	SMSC Status Reports	Not supported.
17	Confirmation Delivery	Not supported.
18	Reply Service	A reply to an incoming message is automatically addressed to the Originating address of the initial message. No user input is necessary.
19	Allow for Callbacks	Optional parameters are not allowed from ICVs, so the callback_num is stripped. Most handsets provide an option to call the originator.
20	User Data (UD, UDH, UDHI)	Not supported
21	Group Distribution List	Not supportedl
22	Distribution lists within SMSC	Not Supported
23	Priority Delivery - queuing	Not supported
24	Deferred Delivery	Not supported
25	Message Throttling	MT throttling rates are negotiated with ICV. No MO throttling.
26	Spamming	Currently controlled for Wireless e-mail
27	Black/White List	Supported if AT&T destination is Smart Limits subscriber.

9.2 Leap

See feature table

9.3 Sprint Nextel

9.3.1 Handset Capabilities

All existing handsets support 2-way SMS.

9.3.2 Subscriber Capabilities

90+% of Sprint Nextel subscribers are 2-way messaging capable.

9.3.3 Preferred Interface

Sprint follows 3GPP SMS messaging standards. Preferred interface is SMPP.

9.3.4 Character Set

Sprint Nextel supports the ASCII character set as a set of emoticons. Sprint Nextel is willing to translate all icons into ASCII as needed, including 7 bit ASCII, 8 bit Latin, and 16 bit UCS.

9.3.5 Message Length

Sprint Nextel's SMS text messaging product has a 160 character limit at this time. Most of the devices support up to 1000 characters with some legacy devices supporting 160 characters.

9.3.6 Concatenated Messages

Is not an issue given the 1000 character limit. Sprint does support on outbound but not widely on the inbound messages. Currently have a small amount of devices launching shortly that will support on inbound.

9.3.7 Distribution Lists

Sprint Nextel will support messages being sent to multiple recipients; however they will be originated as separate messages.

9.3.8 Validity

Messages are retried for 72 hours. 100 messages can be held for retry for 72 hours.

9.3.9 Message priority features

Sprint Nextel does not support message priority at this time. Some handsets support but Sprint does not support in the network.

9.3.10 Reply Path

A reply to an incoming message is automatically addressed to the originating address of the initial message. No user input is necessary.

9.4 US Cellular

See feature table in appendix

9.5 Verizon Wireless

1. Delivery Receipts
   The delivery receipt feature allows customers to keep track of when a message is successfully delivered to the recipient.
   Refer section 2.11 in SMPP 3.4 for delivery receipts
2. Supported Character Set in SMS and EMS
   a. 7-bit ASCII
   b. IA5 Character Set
   c. Latin 1 (ISO-8859-1)
   d. GSM 7-bit (Refer to 3G TS 23.038 V.3.0 (2000-01) for GSM Character Alphabets and Language)
   e. GSM 8-bit (Refer to 3gpp TS 23.038 and 23.040)
   f. Unicode/UCS-2 (16 bit). This feature allows customers to send/receive multilingual messages.

   The messages will be garbled on the handset for all other Character Sets
3. SMS: Max Message length of 140 bytes
4. Enhanced Messaging Service (EMS)
   a. Handset can send a text message of at least 7 segments
   b. Handset can receive a text message of at least 20 segments
5. Priority: Normal and Urgent (refer the section 4.5.9 in SMPP 3.4). Other categories are not supported
6. Deferred delivery up to 5 days
7. Support 10 digit Mobile telephone number addressing only
8. Support Call Back number - used as number to call back
9. Messages to multiple destinations. All group text messages sent as MMS.
   - Handsets support sending messages up to 20 destinations

9.6 T-Mobile USA

9.6.1 Handset capabilities:

All existing T-Mobile handsets do support full 2-way messaging based on the GSM standard 03.40. Depending on the handset manufacturer the user interface and options might vary slightly, but usually go along GSM 03.40 as well.

9.6.2 Subscriber capabilities

100% of existing T-Mobile subscribers is provisioned for 2-way messaging.

9.6.3 SMSC vendor / preferred interface

The SMSC (Short Message Service Center) is provided by CMG. Today the preferred interface to an ICV is SMPP Version 3.4. T-Mobile sees some value in going towards an SS7-based implementation in the future.

9.6.4 Message addressing

The three following addressing schemes are supported: 10-digit, 11-digit, international E.164 format. The destination address can be entered either as 425 444 2835, 1 425 444 2835 or +1 425 444 2835. The originating address is usually displayed in international E.164 format.

9.6.5 Character Set:

T-Mobile uses the standard GSM 7-bit character set according to GSM 03.38. Below the GSM character table and extension table is shown.

Start: From GMS 03.38 (Version 7.2.0, chapter 6.2.1)

Character table:

b7	0	0	0	0	1	1	1	1
b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1

b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	@	Δ	SP	0	¡	P	¿	p
0	0	0	1	1	£	_	!	1	A	Q	a	q
0	0	1	0	2	$	Φ	"	2	B	R	b	r
0	0	1	1	3	¥	Γ	#	3	C	S	c	s
0	1	0	0	4	è	Λ	¤	4	D	T	d	t
0	1	0	1	5	é	Ω	%	5	E	U	e	u
0	1	1	0	6	ù	Π	&	6	F	V	f	v
0	1	1	1	7	ì	Ψ	'	7	G	W	g	w
1	0	0	0	8	ò	Σ	(	8	H	X	h	x
1	0	0	1	9	Ç	Θ	)	9	I	Y	i	y
1	0	1	0	10	LF	Ξ	*	:	J	Z	j	z
1	0	1	1	11	Ø	1)	+	;	K	Ä	k	ä
1	1	0	0	12	ø	Æ	,	<	L	Ö	l	ö
1	1	0	1	13	CR	æ	-	=	M	Ñ	m	ñ
1	1	1	0	14	Å	ß	.	>	N	Ü	n	ü
1	1	1	1	15	å	É	/	?	O	§	o	à

1) This code is an escape to an extension of the 7 bit default alphabet table. A receiving entity which does not understand the meaning of this escape mechanism shall display it as a space character.

GSM 7bit default alphabet extension table

				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
B4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0					|			
0	0	0	1	1								
0	0	1	0	2								
0	0	1	1	3								
0	1	0	0	4		^						
0	1	0	1	5							2)	
0	1	1	0	6								
0	1	1	1	7								
1	0	0	0	8			{					
1	0	0	1	9			}					
1	0	1	0	10	3)							
1	0	1	1	11		1)						
1	1	0	0	12				[				
1	1	0	1	13				~				
1	1	1	0	14				]				
1	1	1	1	15			\					

In the event that an MS receives a code where a symbol is not represented in the above table then the MS shall display the character shown in the main default 7 bit alphabet table in section 6.2.1

1) This code value is reserved for the extension to another extension table. On receipt of this code, a receiving entity shall display a space until another extension table is defined.

2) This code represents the EURO currency symbol. The code value is that used for the character ‘e’. Therefore a receiving entity which is incapable of displaying the EURO currency symbol will display the character ‘e’ instead.

3) This code is defined as a Page Break character and may be used for example in compressed CBS messages. Any mobile which does not understand the 7 bit default alphabet table extension mechanism will treat this character as Line Feed

End: From GMS 03.38 (Version 7.2.0, chapter 6.2.1)

9.6.6 Message length

A single Short Message in GSM is limited to 140 bytes of user data translating to 160 characters based on a 7-bit character set. Different service indicator bits allow to include binary data or extended header information within the user data field. See below for more information.

9.6.7 Concatenated messages

The GSM 03.40 standard in general allows up to 255 messages with 153 characters each. However this feature is handset dependent. Only handset supporting concatenated messages are able to send longer messages and also display them correctly on the receiving end. If a concatenated message is sent to a non-supporting phone, the user will see 3 cryptic characters in front of each single message part.

9.6.8 Distribution list

In general distribution list are supported by the SMSC. Messages to multiple recipients however would be originated as separate messages

9.6.9 Validity Period

The relating field can contain a validity period ranging from 5 minute to a maximum of 63 weeks according to the standards. T-Mobile however limits the range from 1 hour to 168 hours with a default of 72 hours.

9.6.10 Message priority features

Class 0 / Auto Display message allows forcing the message to be displayed on the handset screen upon arrival. No user interaction is required. The message is not stored on the phone/SIM card.
Priority messages will be attempted to deliver irrespective of whether or not the handset has been identified as temporarily absent or having no free memory capacity.
SMSC priority allows moving a message to the top of the queue for a particular subscriber in case there are other messages stored in the SMSC waiting for delivery.

9.6.11 Reply Path

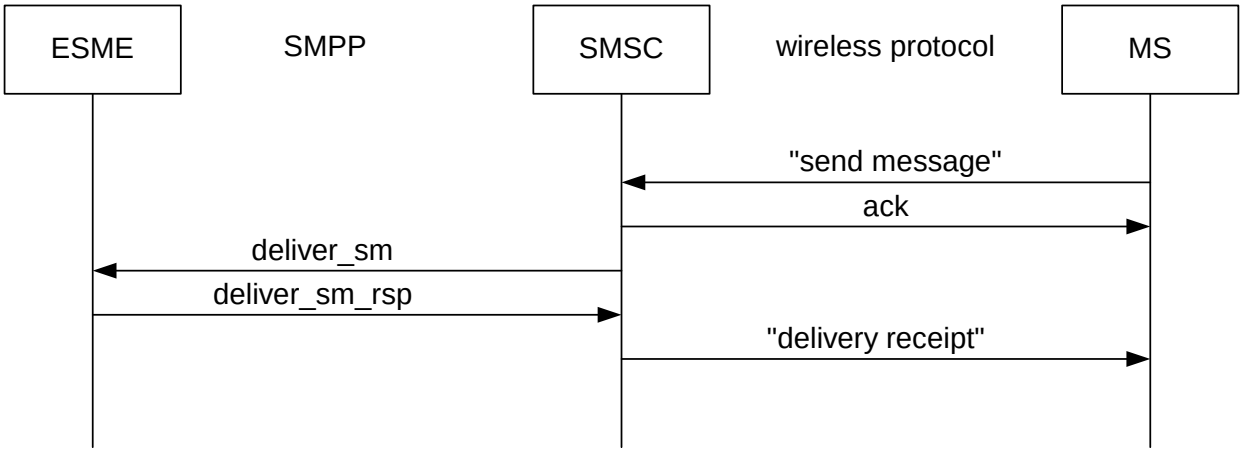
A reply to an incoming message is automatically addressed to the originating address of the initial message. No user input is necessary.
Furthermore according to GSM specification a handset is allowed to indicate in a MO message that the recipient may use the originators SMSC for his reply message.
This feature wouldn’t work for inter carrier messaging.

9.6.12 Message types

The message header includes flags for different types of messages (e.g. voicemail, notifications/receipts, and binary data). Depending on those flags the message might get treated differently in the MS. Even more advanced messaging features can be included by extending the message header to the user data field and indicating that within the message header. Some proprietary implementations as well as EMS (enhanced messaging service) standards make use of that feature.

9.6.13 Status report / delivery receipt

In case of a GSM MO to GSM MT message there is a full end-to-end delivery report available.
As soon as the message gets delivered to the receiving handsets a delivery receipt is generated (if requested) and sent back to the origination handset.
In case of a message being delivered to an ESME (external short message entity) this receipt gets generated as soon as the ESME has acknowledged the message with the submit_sm_rsp reply, even if that doesn't mean that the message has been delivered to the final destination.
Below is an example of the call/signaling flow for the GSM case.



In case the receiving entity (MS or EMSE) is not reachable the message gets stored in the SMSC and a status report with error code/reason is issued to the originating MS. Once the validity period is reached and the message couldn't be delivered in the meantime it gets deleted and a new status report with error code/reason is sent to the originating MS.

9.6.14 Deferred delivery

Based on SMSC functionality a message delivery can be scheduled to happen at a certain time or with a certain delay. It would get stored in the meantime in the SMSC.

10 Appendix B: Feature Table

	AT&T (GSM)	Leap	Sprint	Nextel	Verizon Wireless	T-Mobile	US Cellular CDMA	US Cellular TDMA
2-way handsets (in %)	100	95%	100 (via wireless web)			100	10	50
2-way subscribers	100	95%	90 + (via wireless web)			100	confidential	confidential
SMSC	multiple vendors	Schlumberger Sema				CMG	ADC	Logica
SMPP	yes 3.4	yes 3.4	yes			yes	yes	yes
Addressing	11, E164	10, 11,E164		number@messaging.nextel.com	10	10,11,E164	10,11,E164	10,11,E164
Character set	7-bit GSM, 8-bit GSM UCS2 supported	7-bit ASCII, 8-bit ASCII	ASCII, emoticons		7-bit ASCII	7-bit GSM	7-bit ASCII	7-bit ASCII
Message length	160	160	1000	500	160	160	150	150
Concatenated message	no	no	N/A			yes, depending onhandset	No	No
Distribution list	no	yes	yes, will be sent as separate message			yes, will be sent as different messages	No	No
Validity period	yes, 5 min minimum to 72 hours maximum	variable, 5 minutes to 7 days	72 hours	7days	absolute and realitve up to 5 days	variable, 1-168 hours, default 72 hours	7 days	7 days
Priorities	no	bulk, normal, urgent, very urgent	no		normal, urgent	Auto Display, move to top of queue	Urgent, normal	Urgent, normal
Reply (subscriber DA)	yes	yes	yes		yes, OOA	yes, E164	yes	yes
Call back	not supported	yes			yes	yes	yes	yes
Delivery reciept	not supported	yes (status/delivery)		yes (status/delivery)	yes	yes (status/delivery), if requested and supported by handset)	Yes	Yes
Deferred delivery	no	no			yes up to five days	yes	No	No
Message types	text only	custom text message, voice mail notification						
Delete/replace in SMSC	not supported (not on user level)	yes		canned message	message cancelation		No	No

11 Appendix C: ASCII/GSM character set mapping table

exact match
proposed alternative
no close match

In GSM the ESC character is used to give access to the extension table. In order to avoid any misinterpretation the ESC character in ASCII shall be mapped to a "_" instead of the ESC character in GSM. In the case of mapping from GSM to ASCII the ICV has to detect the ESC sequence an replace the whole sequence with the matching character in ASCII.

GSM to ASCII

GSM	Character	ASCII (7-bit)	proposed Character	Mapped ASCII
0	@	64	@	64
1	£		L	76
2	$	36	$	36
3	¥		Y	89
4	è		e	101
5	é		e	101
6	ù		u	117
7	ì		i	105
8	ò		o	111
9	Ç		C	67
10	LF	10	LF	10
11	Ø		O	79
12	ø		o	111
13	CR	13	CR	13
14	Å		A	65
15	å		a	97
16	□		_	95
17	_	95	_	95
18	□		_	95
19	□		_	95

ASCII to GSM

ASCII	Character	proposed Character	Mapped GSM
0	NUL	_	17
1	SOH	_	17
2	STX	_	17
3	ETX	_	17
4	EOT	_	17
5	ENQ	_	17
6	ACK	_	17
7	BEL	_	17
8	BS	_	17
9	HT	SP	32
10	LF	LF	10
11	VT	_	17
12	FF	page brk	E10
13	CR	CR	13
14	SO	_	17
15	SI	_	17
16	DLW	_	17
17	DC1	_	17
18	DC2	_	17
19	DC3	_	17

20	□		_	95	20	DC4	_	17
21	□		_	95	21	NAK	_	17
22	□		_	95	22	SYN	_	17
23	□		_	95	23	ETB	_	17
24	□		_	95	24	CAN	_	17
25	□		_	95	25	EM	_	17
26	□		_	95	26	SUB	_	17
27	ESC		indicates use of GSM extension table		27	ESC	_	17
28	Æ		A	65	28	FS	_	17
29	æ		a	97	29	GS	_	17
30	ß		s	115	30	RS	_	17
31	É		E	69	31	US	_	17
32	SP	32	SP	32	32	SP	SP	32
33	!	33	!	33	33	!	!	33
34	"	34	"	34	34	"	"	34
35	#	35	#	35	35	#	#	35
36	¤		_	95	36	$	$	2
37	%	37	%	37	37	%	%	37
38	&	38	&	38	38	&	&	38
39	'	39	'	39	39	'	'	39
40	(	40	(	40	40	(	(	40
41	)	41	)	41	41	)	)	41
42	*	42	*	42	42	*	*	42
43	+	43	+	43	43	+	+	43
44	,	44	,	44	44	,	,	44
45	-	45	-	45	45	-	-	45
46	.	46	.	46	46	.	.	46
47	/	47	/	47	47	/	/	47
48	0	48	0	48	48	0	0	48
49	1	49	1	49	49	1	1	49
50	2	50	2	50	50	2	2	50
51	3	51	3	51	51	3	3	51
52	4	52	4	52	52	4	4	52
53	5	53	5	53	53	5	5	53
54	6	54	6	54	54	6	6	54
55	7	55	7	55	55	7	7	55
56	8	56	8	56	56	8	8	56
57	9	57	9	57	57	9	9	57

58	:	58	:	58	58	:	:	58
59	;	59	;	59	59	;	;	59
60	<	60	<	60	60	<	<	60
61	=	61	=	61	61	=	=	61
62	>	62	>	62	62	>	>	62
63	?	63	?	63	63	?	?	63
64	¡		!	33	64	@	@	0
65	A	65	A	65	65	A	A	65
66	B	66	B	66	66	B	B	66
67	C	67	C	67	67	C	C	67
68	D	68	D	68	68	D	D	68
69	E	69	E	69	69	E	E	69
70	F	70	F	70	70	F	F	70
71	G	71	G	71	71	G	G	71
72	H	72	H	72	72	H	H	72
73	I	73	I	73	73	I	I	73
74	J	74	J	74	74	J	J	74
75	K	75	K	75	75	K	K	75
76	L	76	L	76	76	L	L	76
77	M	77	M	77	77	M	M	77
78	N	78	N	78	78	N	N	78
79	O	79	O	79	79	O	O	79
80	P	80	P	80	80	P	P	80
81	Q	81	Q	81	81	Q	Q	81
82	R	82	R	82	82	R	R	82
83	S	83	S	83	83	S	S	83
84	T	84	T	84	84	T	T	84
85	U	85	U	85	85	U	U	85
86	V	86	V	86	86	V	V	86
87	W	87	W	87	87	W	W	87
88	X	88	X	88	88	X	X	88
89	Y	89	Y	89	89	Y	Y	89
90	Z	90	Z	90	90	Z	Z	90
91	Ä		A	65	91	[	[	E60
92	Ö		O	79	92	\	\	E47
93	Ñ		N	78	93	]	]	E62
94	Ü		U	85	94	^	^	E20
95	§		_	95	95	_	_	17

96	¿		?	63
97	a	97	a	97
98	b	98	b	98
99	c	99	c	99
100	d	100	d	100
101	e	101	e	101
102	f	102	f	102
103	g	103	g	103
104	h	104	h	104
105	i	105	i	105
106	j	106	j	106
107	k	107	k	107
108	l	108	l	108
109	m	109	m	109
110	n	110	n	110
111	o	111	o	111
112	p	112	p	112
113	q	113	q	113
114	r	114	r	114
115	s	115	s	115
116	t	116	t	116
117	u	117	u	117
118	v	118	v	118
119	w	119	w	119
120	x	120	x	120
121	y	121	y	121
122	z	122	z	122
123	ä		a	97
124	ö		o	111
125	ñ		n	110
126	ü		u	117
127	à		a	97

96	`		'	39
97	a	a		97
98	b	b		98
99	c	c		99
100	d	d		100
101	e	e		101
102	f	f		102
103	g	g		103
104	h	h		104
105	i	i		105
106	j	j		106
107	k	k		107
108	l	l		108
109	m	m		109
110	n	n		110
111	o	o		111
112	p	p		112
113	q	q		113
114	r	r		114
115	s	s		115
116	t	t		116
117	u	u		117
118	v	v		118
119	w	w		119
120	x	x		120
121	y	y		121
122	z	z		122
123	{	{		E40
124	|	|		E64
125	}	}		E41
126	~	~		E61
127	DEL	_		17

Ext. tbl

E10	Pg brk		FF	12
E20	^	94	^	94
E40	{	123	{	123
E41	}	125	}	125
E47	\	92	\	92

E60	**[**	**91**	**[**	**91**
E61	**~**	**126**	**~**	**126**
E62	**]**	**93**	**]**	**93**
E64	**|**	**124**	**|**	**124**
E165	**€**		**e**	**101**

12 Abbreviations and Definitions

ASCII – American Standard Code for Information Interchange
CARRIER – a CMRS wireless network operator
CMRS – Commercial Mobile Radio Service (defined in Section 20.9 of the FCC's rules, 47 C.F.R. 20.9. (http://law.justia.com/cfr/title47/47-2.0.1.1.1.0.1.6.html)
CDMA – Code Division Multiple Access
CTM – Custom Text Message
ESME – External Short Message Entity
GSM – Global Standard for Mobile Communication
ICV – Inter Carrier Vendor – vendors providing connectivity between wireless subscribers, networks, and services
MIN – Mobile Identification Number
MO – Mobile Originated
MS – Mobile Station
MSISDN – Mobile Station ISDN number
MT – Mobile Terminated
NPA-NXX – represents area code and exchange of the North American Numbering Plan
NON-CMRS – non-carrier service providers
SERVICE PROVIDER – a non-CMRS entity providing messaging services intending to interoperate with CMRS-based SMS text messaging
SLA – Service Level Agreement
SME - Short Message Entity
SMPP – Short Message Peer-to-Peer Protocol
SMS – Short Message Service
SMSC – Short Message Service Center
TDMA – Time Division Multiple Access
UD – User Data
UDH – User Data Header
UDHI User Data Header Indicator
VENDOR – Intermediary company hired to provide a good or service
VMN – Voice Mail Notification