

PEAK MSC Administrator

User Manual

TLC SOLUTIONS INC.



TLC Solutions Inc.
USER FIRST TECHNOLOGY

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Preface

General Information

The information in this document describes the connectivity and deployment of TLC Solutions' Laptop GSM (LTGSM) System (Separate Components).

Intended Users of this Guide

This guide is intended to be read by individuals responsible for the deployment and use of the LTGSM System. It is assumed that the reader has a basic knowledge of Global Systems for Mobile Communications (GSM) technology.

Conventions Used in this Guide



WARNING – Alerts the reader to a situation that might affect personal safety.



CAUTION – Alerts the reader to a situation that might affect the integrity of equipment, software or data.



NOTE – Provides the reader with important or supporting information.



STOP – Informs the reader that a procedure is finished.



Guide Organization

The guide is organized as follows:

Section 1, “Acronyms”, provides a list of acronyms used in this manual.

Section 2, “Quick Installation Guide”, provides step by step procedures on installing the LTGSM.

Section 3, “Configuration Guide”, provides information on the Web Browser interface and how to properly administer the LTGSM.

Section 4, “I/O Connector Pinouts”, provides pinouts for all external connectors on the LTGSM.

Section 5, “dBm to Watts Conversion Table”, provides a dBm to Watts conversion table.

Section 6, “ARFCN Frequencies”, provides the ARFCN frequencies for the 850, 900, 1800, and 1900 MHz frequency bands.



Safety Precautions

The following general safety precautions must be observed during all phases of system installation, service, and repair of this equipment. Failure to comply with these precautions or specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of this equipment. TLC Solutions, Inc. assumes no liability for the customer's failure to comply with these requirements.

The safety precautions listed below represent warnings of certain dangers that TLC Solutions, Inc. is aware of. As the user of the product, you should follow these warnings for the safe operation of the equipment in your operating environment.

Read this Guide Thoroughly



CAUTION - The technician must be completely familiar with the procedures contained in this document before beginning the actual installation.

Complete all Steps



CAUTION - The technician must perform each procedure in its entirety.

Ground the Equipment



WARNING - To minimize shock hazard, the equipment should be connected to a properly grounded electrical outlet.

Only Qualified Personnel Should Service the Equipment



WARNING - Only trained personnel may remove equipment covers to install and service the internal assemblies of the LTGSM. The LTGSM contains high-energy equipment that can cause injury or death. Under certain conditions, dangerous voltages and/or currents may exist even with the power supply removed.

Do Not Service or Adjust Alone



WARNING - Do not attempt internal service or adjustment unless another person capable of rendering first aid and resuscitation is present. Dangerous voltages and/or currents, capable of causing injury or death, are present in this equipment.



Do Not Operate in an Explosive Atmosphere



WARNING - Do not operate the equipment in the presence of flammable gases or fumes. Operation of electrical equipment in such an environment creates a definite safety hazard.

Do Not Substitute Parts or Modify Equipment



WARNING - Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification of equipment.



Periodic Maintenance

Due to the simplicity of the LTGSM very little maintenance is required. The following items should be performed on a periodic basis:

- Back up the configuration database (after every major system change)
- Test the system monthly to ensure it operates correctly
- Clean all components of the system with a soft damp cloth and compressed air as needed
- Test cables periodically and replace as needed.



Caution

CAUTION – Do not clean the system components when in operation. Never use a wet cloth to clean the system as there are vent holes that may allow moisture inside the chassis. If a damp cloth is used to clean the system components allow 24 hours of drying time before the next power up.



WARNING

WARNING – Never use a damp cloth on the system while it is in operation. Doing so may cause death or injury from electric shock! Always unplug any device before maintenance or cleaning.

Technical Support

TLC provides technical support to its customers based on contract requirements. The technical support department can be reached at 904-829-0323 option #3 24 hours a day. In addition each customer is provided with a user name and password to access user documentation and other important information at TLC's web site. The URL is www.toplevelcom.com/support. You must have a username and password to access documentation and software.



Section 1 – Common Acronyms

Abis	Refers to the BSC-BTS data link
ARFCN	Absolute Radio Frequency Channel Number
BCCH	Broadcast Control Channel
BSC	Base Station Controller
BSS	Base Station System
BTS	Base Transceiver Station
CPU	Central Processing Unit
CSD	Circuit Switch Data
DSP	Digital Signal Processor
EDGE	Enhanced Data Rates for GSM Evolution
FTP	File Transfer Protocol
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GSM	Global Systems for Mobile Communications
GSN	GPRS Support Node
HLR	Home Location Registry
HPA	High Power Amplifier
IP	Internet Protocol
ISDN	Integrated Services Digital Network
MCPA	Multi-Carrier (High) Power Amplifier
MMS	Multimedia Message Service
MMSC	Multimedia Messaging Service Center
MS	Mobile Station
MSC	Mobile Switching Center
OMC-R	Operations Maintenance Center – Radio
PBX	Private Branch Exchange
PRI	Primary Rate Interface
PSTN	Public Switched Telephone Network
RF	Radio Frequency
SCPA	Single Carrier Power Amplifier
SGSN	Serving GPRS Support Node
SMS	Short Message Service
SMSC	Short Messaging Service Center



TRAU
VLR

Transcoder and Rate Adaptation Unit
Visitor Location Registry



Section 2 – Quick Deployment Guide



CONVENTIONS USED



WARNING – Alerts the reader to a situation that might affect personal safety.



CAUTION – Alerts the reader to a situation that might affect the integrity of equipment, software or data.



NOTE – Provides the reader with important or supporting information.



STOP – Informs the reader that a procedure is finished.

STRAIGHT ETHERNET CABLE

CROSS OVER ETHERNET CABLE

SMA MALE TO SMA MALE (TX)

SMA MALE TO SMA MALE (RX)

N-Type Male to 7/16 DIN Male (ANT)



Step # 1:

Insert Security Dongle into any available USB port on Main laptop.



DO NOT PLUG BOTH LAPTOPS AT THE SAME TIME INTO SYSTEM. THIS WILL CAUSE PROBLEMS IN YOUR NETWORK.



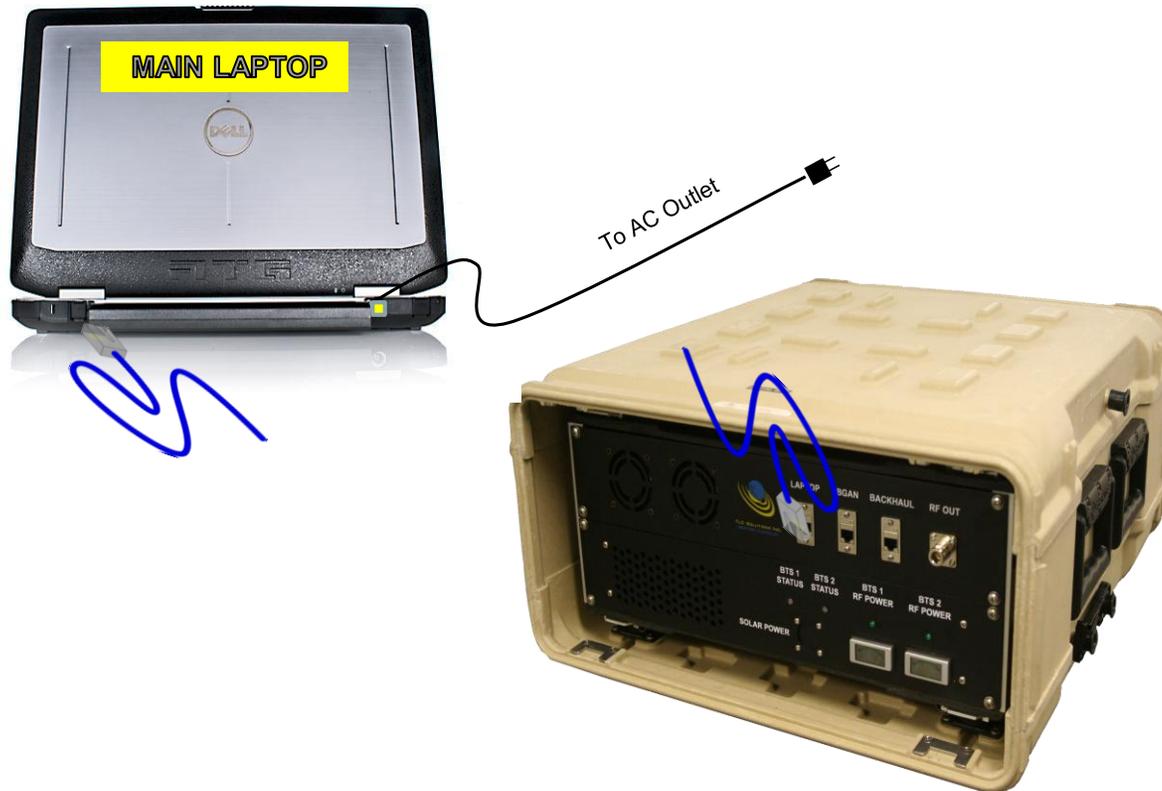
LOCAL SITE



Step # 2:

Connect the LAN port on the Main Laptop to the LAN port on the front panel stating "laptop". Use cable with white boot's on both ends.

LOCAL SITE





Step # 3:

Press the power button above the keyboard on the laptop.

LOCAL SITE





Step #4:

After boot-up two processes will be running at the bottom “SMSC” and “MSC”. Wait 20 - 30 seconds to allow processes to start.

LOCAL SITE





Step # 5:

Click on PMN Admin Icon to begin set up of MSC.

LOCAL SITE





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Section 3 Configuration Guide

Introduction

This document introduces the Management System of the LTGSM solution and should initially be read in conjunction with the Quick Start Guide for the LTGSM. The Quick Start Guide details how to physically connect-up your LTGSM.

This System Administrator User Guide can be used as a training and/or reference document by anyone who requires access to the Management System in order to configure, administer, register handsets or support the LTGSM. Typically this is likely to be a Network Manager, System Administrator, Telecoms Administrator or a Support member of staff.

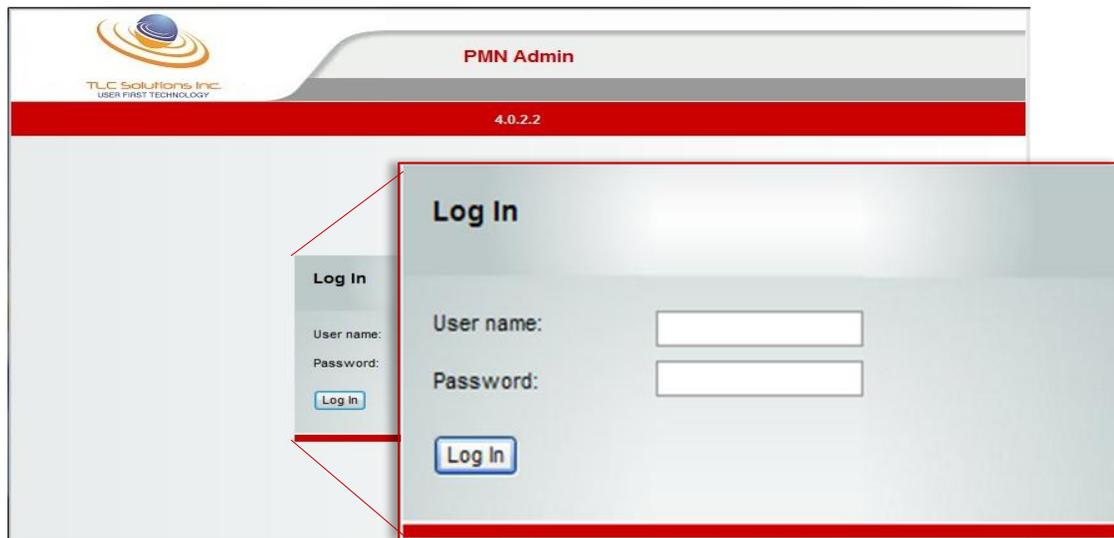
Anyone needing to use the LTGSM Management System should refer to the following section of this document for further information on how to use the LTGSM interface:

Starting your PMN system configuration

Launch PMX Administrator from a laptop shortcut or browser from any other PC with access to the network.

NOTE: The version number of the software you are using is displayed under the page title (see below). This may be useful to know when troubleshooting the system. Once the PMX Admin Log In screen appears (see below):

You will be prompted to enter your user credentials.



- From this screen, enter your **User name**.
- Enter your **Password**.
- Once complete, click **Log In**.



NOTE: If you have forgotten your details, please contact www.toplevelcom.com/support.

Once you have successfully logged into PMX Administrator, you will be presented with the **Partitions** screen, as shown below.

Name	Description	Emergency Status	Anonymous Partition
TLC MSC		None	No

- From the **Partitions** screen, click on the required partition to select it (see previous diagram).

NOTE: In a brand new system, there will be no partitions configured.

- Log Out
- Create Partition
- Edit Partition
- Delete Partition
- Edit Authentication Settings
- Edit Check IMEI Settings
- Edit Divert Settings
- Edit Operator Country Settings
- Location Areas (1)
- Pending Provisions (0)
- Premium Prefixes (0)
- Presence (0)
- Routes (5)
- SMS Distribution Groups (2)
- Subscriber Number Ranges (1)
- Subscribers (50)
- Transformation Groups (0)
- Welcome SMS Messages (0)

Once the partition has been selected and highlighted, you will see the current configurations relevant to that partition displayed to the left of the screen. This is a dynamic area and will change depending on the partition you have selected and the configurations within it.

The numbers shown in brackets, to the right of the various different components (see left) indicate the number of items configured within each section.

Each section can be clicked to access that area of the partition. This makes navigating around the PMX Administration software much easier and quicker.

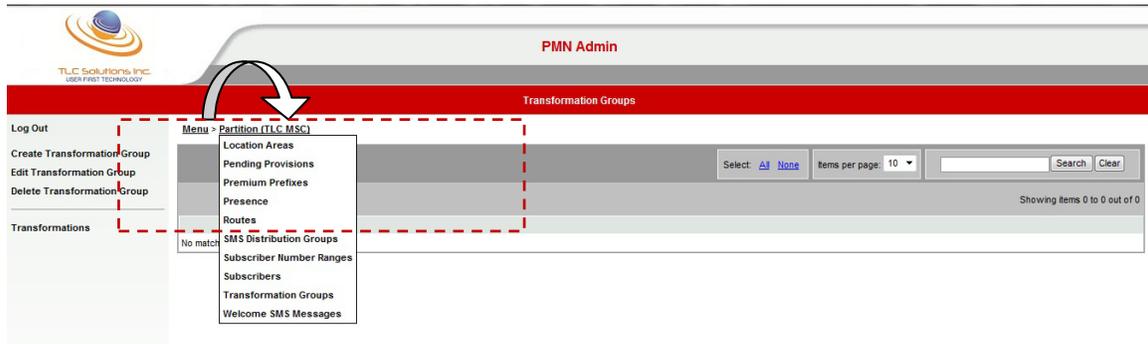
NOTE: In reality, the numbers shown in the diagram left may not be representative of the partition you have configured and are purely for illustration purposes.

The Breadcrumb Menu

While the left-hand menu (detailed above) is one way of navigating around the software, there is an alternative way to do this via the Breadcrumb menu along the top of the screen.



'Breadcrumbs' are another way of navigating around the PMX Administration software quickly and easily. The Breadcrumb menu that is located underneath the sub-heading of every screen. It is referred to as a 'breadcrumb' because it will indicate the location in the application that the user is currently at, and the path they have taken to get there, every step of the way, from the start page (see below). The further you have navigated into the system, the longer the trail will be.



Each of the breadcrumb items will have a link that, when clicked, will redirect the user back to the appropriate page. Each link will, where appropriate, also have a hover menu that will allow the user to navigate the further screens associated to the breadcrumb link. This helps you to navigate back to earlier menus much more quickly.

NOTE: There are some screens within PMX Administrator that are for information only and do not have left-hand menu links to return to other screens. In these examples, navigation can only be done via the breadcrumb menu's.

Searching & Selecting

If the screen you are looking at within PMX Administrator is displaying a large number of records, on any screen, it may help if you could select, or search the records based on a refined search criteria.

At the top of screen you will see a number of features to help you select, search or display the records in different ways (see below). Each of the 3 sections along the screen can be used independently and are detailed below.



PMN Admin

Partitions

Log Out
Create Partition
Edit Partition
Delete Partition

Menu

Items per page: 10 Search Clear

Select: [All](#) [None](#) Items per page: 10 Search Clear

Showing items 1 to 1 out of 1

Location Areas	(1)
Pending Provisions	(0)
Premium Prefixes	(0)
Presence	(0)
Routes	(5)
SMS Distribution Groups	(2)
Subscriber Number Ranges	(1)
Subscribers	(50)
Transformation Groups	(0)
Welcome SMS Messages	(0)

Looking at it from left-to-right, the **Search** 'bar' above allows you to:

- Select **All / None** records displayed.
 - Click the links (in blue) to select **All** (i.e. all visible records are selected) or **None** (i.e. all selected records will be deselected).
 - Individual records can still be selected / deselected manually.

NOTE: The **Select All / None** feature is only available on screens where records can be individually selected by using their checkbox.
- Determine the number of records displayed on a page.
 - From the **Items per page** dropdown list, select either **10**, **20** or **50**.
 - The selected number of records will be displayed and the number of pages the records take up will be recalculated accordingly.
- Search for particular records by adding a numerical or textual string to the **Search** field.
 - In the blank field above, type your search criteria (e.g. name, number, etc.).
 - Once added, click **Search**. The system will search through all matching records for the page you are on and display any records that match.
 - To return to the full list, click **Clear**.

Sorting

If you are reviewing a number of records on screen, it may be easier to view them if they were organised, and sorted, using another column details, rather than the default left-hand column. While not initially visible, clicking on any of the column headings displayed will sort that column in ascending order, either numerically or alphabetically (depending on the contents of the column).



PMN Admin

Subscribers

Menu > Partition (TLC MSC)

Select: All None Items per page: 10 Search Clear

Showing items 1 to 10 out of 50

IMSI	Number	TON	DDI Mobile Network No.	Profile	Emergency Privilege	VLR	Account Suspended	Incomplete	Roaming Restriction	LA Not Allowed
Hunt Group	00004205	4205	4205		No	Not Suspended	No	No	No	

The column currently being sorted upon will show a small black arrow next to the heading (see above).

NOTE: To sort the column in a **descending** order, click the heading again. The arrow will change to point down to signify this and the records for that column will be re-ordered into descending order. This works as a toggle.

Logging Out

When you no longer need to use the PMX Administration software, then you should log out of the system. This also ensures the security and integrity of the data within the application.

NOTE: If the system is not used for 15 minutes (default setting), then you will be automatically logged out when you next attempt to navigate within the system.

To log out of the PMX Administration software:

- From any screen within PMX Administration, click **Log Out** from the left-hand menu.
- The following dialog box will be displayed.



- Click **OK** and you will be returned to the **Log In** page (or **Cancel** to abort the process).

NOTE: For more information on logging in, please refer to the earlier section entitled *Starting your PMX Administration Software*.

Once logged out, the browser window can be closed.

Change Password

For security reasons, you may wish to change your PMX Administrator's password from time to time or if you feel your current password has been compromised.

NOTE: The **Change Password** option is only available from the **System** screen.

To change your password:

- From the **System** screen, click **Change Password** from the left-hand menu.



NOTE: To navigate to the **System** screen, please refer to the *System Configuration* screen later in this manual.

- The following dialog box will be displayed.

The image shows a 'Change Password' dialog box with a red title bar. It contains three text input fields: 'Current Password', 'New Password', and 'Confirm New Password'. At the bottom right, there are two buttons: 'Submit' and 'Cancel'.

- Complete the fields as detailed below.

NOTE: For security purposes, any letters typed into the fields below will be replaced by non-identifying characters on screen.

- | | |
|-----------------------------|---|
| Current Password | Enter your current password in the field. |
| New Password | Enter your new password. This password needs to be between 8 and 50 alpha-numeric characters and is case-sensitive. |
| Confirm New Password | Confirm your new password by re-entering it. |

- Once complete, click **Submit** (or **Cancel** to abort the process).

Once submitted, your old password will change to the new and will be required the next time you attempt to log into PMX Administrator.

PMX Administration Structure

From Release 4 onwards, the PMX Administration software is structured into a two-level system. There are the higher **System** settings and below that, there are **Partitions** (formerly referred to as *Tenants* or *Tenancies*).

System Settings

The System settings will contain functionality that allows the user to configure items at the highest level and will be utilised by all partitions. Configuration of items will include the ability to create, edit or delete items. The functionality associated to each item is described in later in this document.

The following items are configurable from the **System** section.

- Password changes
- Forbidden IMEIs
- Gateways
- Mobile Switching Centre (MSC)
 - Base Station Controllers
 - Location Area's



- Add / Remove Cells
- Providers
- Routes
- Transformation Groups
 - Transformations and Patterns.
- Log out.

Partition Settings

The **Partition** section will contain functionality that allows the user to configure items against individual partitions; these could be different companies or divisions within an organisation that can be configured differently from each other. Because of this, partitions have more individual settings to configure than System settings.

Configuration of items will include the ability to create, edit and delete items. The functionality associated to each item is described in detail later in this document.

The following items are configurable from the Partition section:

- Location Areas
- Pending Provisions
- Premium Prefixes
- Presence
- Routes
 - Destinations
 - Patterns
 - Transformation Groups
 - Transformations
 - Patterns
- SMS Distribution Groups
 - Send SMS Message
 - Subscribers
- Subscribers
 - Edit Authentication / GPRS / ODB / Supplementary Services
 - Hunt Groups
- Subscriber Number Ranges
- Transformation Groups
 - Transformations
 - Patterns.
- Welcome SMS Messages
- Log out.

NOTE: Some section titles listed above are duplicated (e.g. Transformations, Patterns) in both System and Partition configuration sections and, subsequently even appear as sub-options under a number of Partition specific headings. While their functionality will be the same, the implications on changes made in the incorrect section may result in unwanted changes to your



PMX system. Please ensure you are referencing the correct section to ensure the system remains robust.

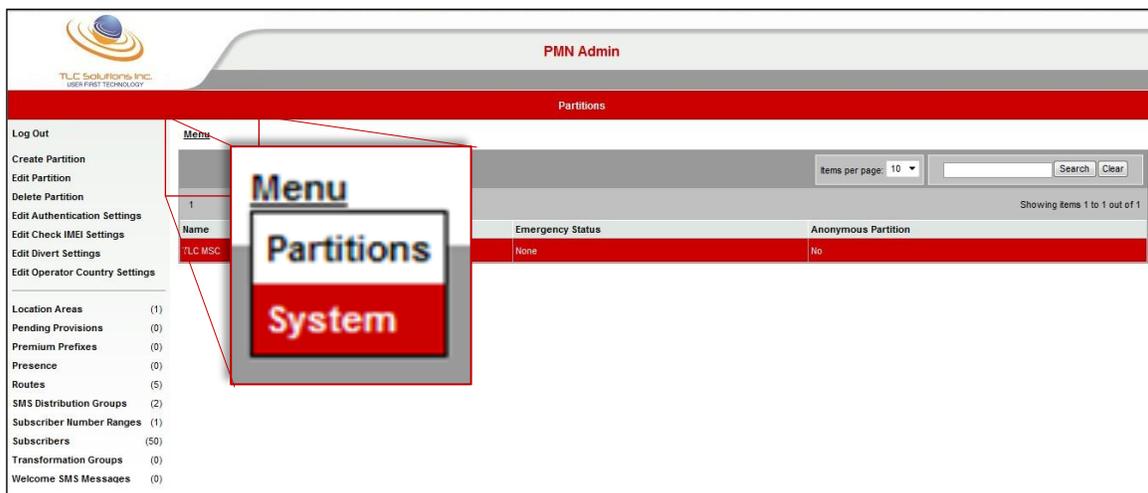
System Configuration

PMX Administrator allows the configuration of **System** and **Partition** settings. This section relates to the System settings which are predominately (but not exclusively) concerned with the configuration of the hardware that manages the PMX network you are using.

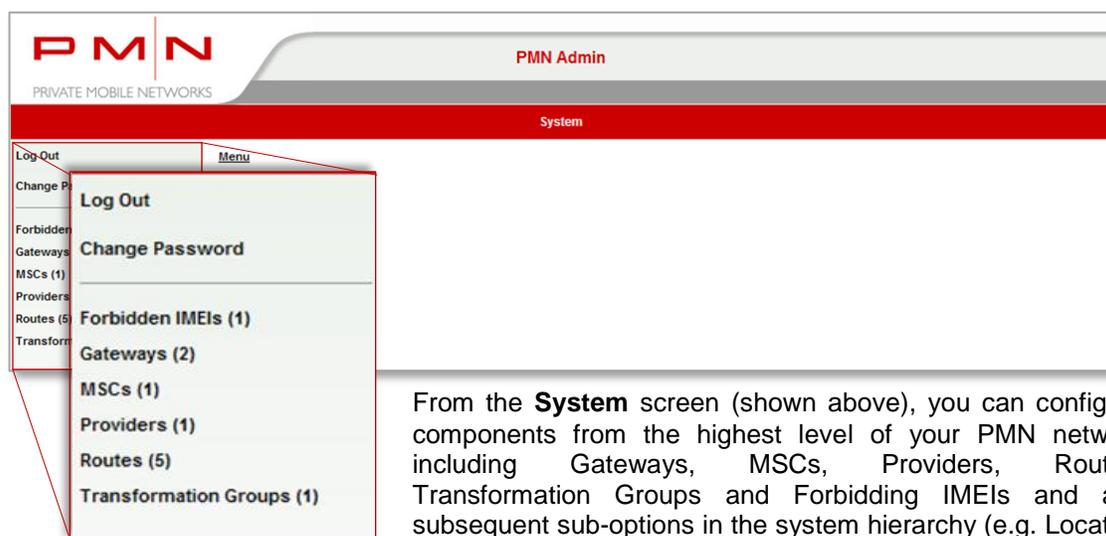
When you first log into PMX Administrator, the **Partitions** screen will be displayed. However, to access the **System** configuration options:

- From the breadcrumb menu, with your cursor, hover over the **Menu** link (as shown below). This is the first link of the 'breadcrumb menu'.

NOTE: There is no need to 'click' the Menu link for the options to appear.



- From the resulting pop-up menu, click **System** (as above).
- The following screen will be displayed. This is the **System** screen.



From the **System** screen (shown above), you can configure components from the highest level of your PMN network including Gateways, MSCs, Providers, Routes, Transformation Groups and Forbidding IMEIs and any subsequent sub-options in the system hierarchy (e.g. Location Areas, Cells, etc.).



Again, the numbers shown in brackets indicate the number of items configured within that system section. Each section heading can be clicked to access that area of the partition.

NOTE: The components are described in the following sections in the order they are shown on the menu (with the exception of *Log Out* and *Change Password*), rather than the logical order you would configure them.

Partition Configuration

PMX Administration is, by design, built around a multi-partitioned network structure which allows different parties to securely share network resources.

Having configured the System level settings (see previous sections), browse to the **Partitions** screen by using the Menu link at the top of the page. The Partitions screen will be default screen when logging into PMX Administration.

You will be presented with the list of currently configured partitions.

Partitions

From here you can configure many of the settings on a partition-by-partition basis.

The screenshot shows the PMN Admin interface. At the top, there's a header with the TLC Solutions, Inc. logo and the text 'PMN Admin'. Below that, a red bar contains the word 'Partitions'. A left-hand menu is visible, with a red box highlighting the following items: Log Out, Create Partition, Edit Partition, Delete Partition, Edit Authentication Settings, Edit Check IMEI Settings, Edit Divert Settings, and Edit Operator Country Settings. The main content area features a search bar with 'Items per page: 10' and 'Search Clear' buttons. Below the search bar, there's a table with two columns: 'Emergency Status' and 'Anonymous Partition'. The table shows one row with 'None' and 'No' respectively. The text 'Showing Items 1 to 1 out of 1' is displayed at the bottom right of the table.

This screen will also include specific menu options for Partitions and the additional configurations relating to Authentication, Diverts, etc.

These options can be navigated by using the clicking the relevant option from the left-hand side menu (see above). These links will be required, and referenced, for the additional options described below.



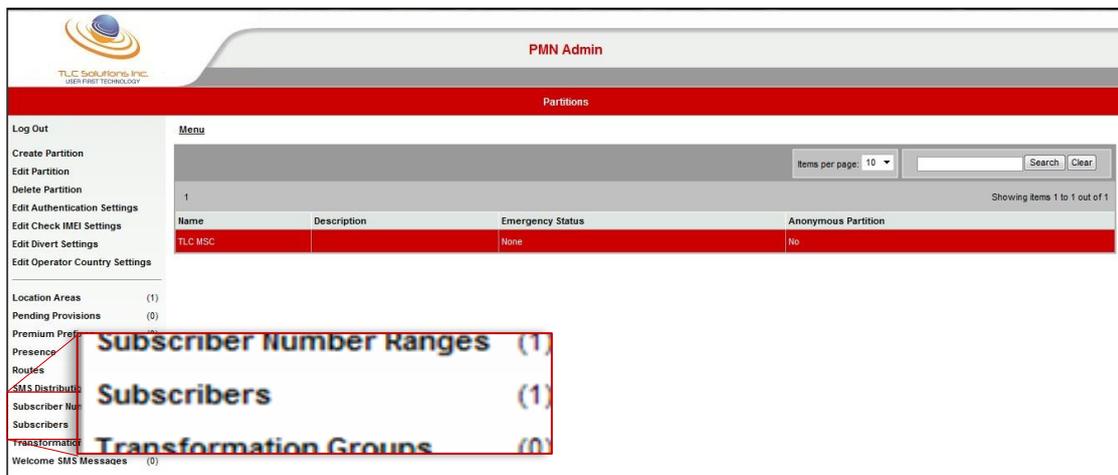
Subscribers

PMX Administration uses the IMSI (International Mobile Subscriber Identity) number of the handset's SIM card as the primary means of authorisation on the network, however, this number may not be known when provisioning handsets on the network.

PMX Administration has therefore provided two methods of provisioning. The first is detailed in the Pending Provisions section earlier in this manual. The second detailed below, requires you to know the IMSI number of the SIM.

Assuming the Subscriber Number Range has already been set (see earlier section entitled *Subscriber Number Ranges* for more information) and contains at least 1 spare number, provision a new handset using the SIM number by creating **Subscribers**.

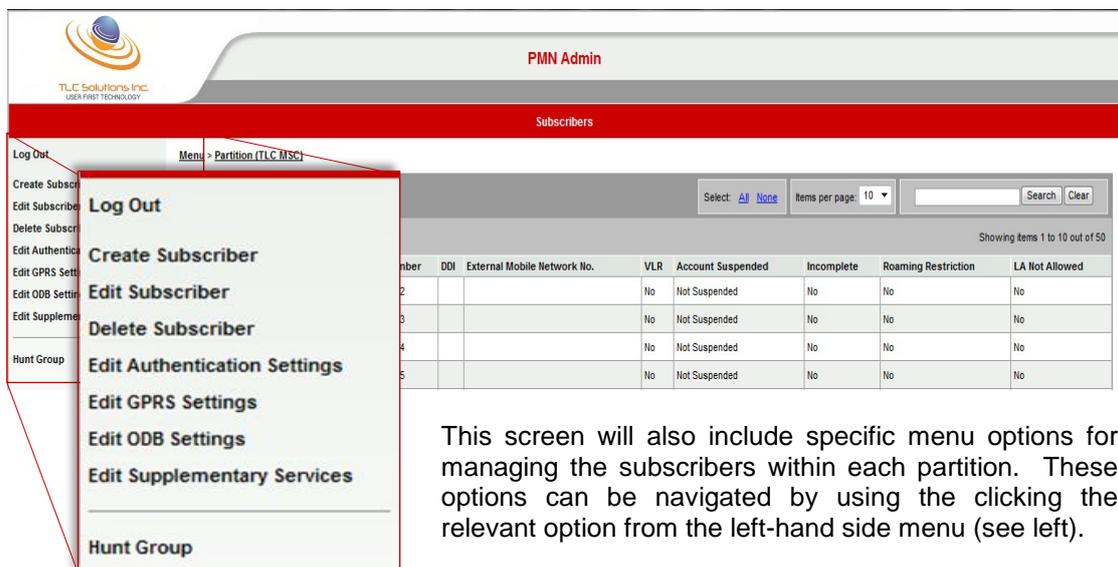
NOTE: The secondary method allows you to provision a handset by using the handset IMEI (International Mobile Equipment Identity). For more details, please refer to the *Pending Provision* section earlier in this manual.



To access the Subscribers section:

- From the **Partitions** screen, click **Subscribers** from the left-hand menu (as above).
- The following screen will be displayed. This is the **Subscribers** screen. If any subscribers have already been created on the system they will be listed here.

NOTE: In previous versions of this software, Subscribers were known as Extensions.



This screen will also include specific menu options for managing the subscribers within each partition. These options can be navigated by using the clicking the relevant option from the left-hand side menu (see left).



These links will be required, and referenced, for the additional options described below.

NOTE: If a handset fails to register to the MSC for any reason, the system will log the reason for the failure as a code. The code will vary depending on the reason for failure. This may be useful to help troubleshoot the system. Please refer to *Appendix 2* for more information on error codes.

Create Subscriber

To create a new subscriber:

- From the **Subscribers** screen, click **Create Subscriber** from the left-hand menu.
- The following dialog box will appear.

Create Subscriber	
IMSI	<input type="text"/>
Description	<input type="text"/>
SIP Registration Enabled	<input checked="" type="checkbox"/>
SIP Password	<input type="text"/>
Number	<input type="text" value="-"/>
TON	<input type="text" value="National (0x81)"/>
0x	<input type="text"/>
DDI	<input type="text"/>
External Mobile Network No.	<input type="text"/>
Profile	<input type="text" value="Normal Subscriber"/>
Emergency Privilege	<input type="text" value="None"/>
VLR	<input type="checkbox"/>
Account Suspended	<input type="text" value="Not Suspended"/>
Display Text	<input type="text"/>
Presentation CLI	<input type="text"/>
Telephony	<input checked="" type="checkbox"/>
SMS-MT	<input checked="" type="checkbox"/>
SMS-MO	<input checked="" type="checkbox"/>
Force Out	<input type="checkbox"/>
<input type="button" value="Submit"/> <input type="button" value="Cancel"/>	

- Complete the fields as detailed below.

IMSI	Insert the 15 digit IMSI (<i>International Mobile Subscriber Identity</i>) for this subscriber.
Description	Add a descriptive name for this subscriber. This could be the user's name, or a description of the phone they are using. It should make the extension easily identifiable from a list.
SIP Registration	This specifies whether the registration and existence of a



Enabled	GSM handset on the network should trigger a corresponding SIP registration to a SIP Registrar. NOTE: If not being used, it should be 'unticked'.
SIP Password	If SIP Registration is enabled above, then this allows the specification of a password for SIP authentication if the Registrar requires one. NOTE: This field is only available if the SIP Registration field above is ticked.
Number	Select the extension number to be associated with the IMSI number from the drop-down list. This number will be the internal private network number. This drop-down list will contain all those numbers from your Subscriber Number Range(s) that have not already been allocated. They are usually 4 digits. NOTE: This is a required field. For more information on number ranges, please refer to the <i>Subscriber Number Ranges</i> section later in the manual.
TON (Type of Number)	This field is used to describe the type of extension number in the field selected above. NOTE: Usually the extension number will be a National (0x81) number.
DDI	The DDI field is relevant if the handset has a presence on a wider telephony network, for instance, where the PMX handset could be directly dial-able from the PSTN. This field is optional.
External Mobile Network No.	If you're using a macro network SIM and have a different extension number in PMX, then this field can be populated with your macro network number (e.g. 07xxxxxxxx). This allows other PMX users to call you by using the macro number, as well as your PMX extension number. This field is optional. NOTE: If your external mobile number entered here is the same as the number used in the Number field above, leave this section blank.
Profile	Select this subscriber's required profile (class of service) from the drop-down list if it isn't already selected. <i>Normal Subscriber</i> For users who expect to be registered primarily on the PMX network. Such users would issue their external landline number to their callers. PMX will accept calls in from this number and route calls to the PMX extension. If the PMX extension is not registered at the time, the call will be routed to the external mobile number. <i>Internal Only</i> Intended for users who expect to use their macro network mobile number most of the time. Such users would issue their normal mobile number to callers and forward calls to the 'DDI Number' when not present on the macro network. Their normal mobile number would be the primary point of contact with calls routed to PMX if not on the macro network. Calls for these users



are then kept 'internal only' on the PMX network i.e. PMX will not dial back out to 'External Mobile Network Number' at any point, either for voice calls or text messages.

Emergency Privilege

This option allows you the ability to set different levels of emergency privileges. Should the partition this subscriber is registered to have an emergency status invoked, only subscribers with an equal, or higher privilege, will be allowed to use their PMX extension to make calls during that time.

- None* Subscribers will not be able to make or receive calls if the partition has any level of Emergency Status invoked.
- Minor Occurrence* Subscribers with this privilege will still be able to make and receive calls if the partition Emergency Status is set to Minor Occurrence or below.
- Minor Incident* Subscribers with this privilege will still be able to make and receive calls if the partition Emergency Status is set to Minor Incident or below.
- Major Occurrence* Subscribers with this privilege will still be able to make and receive calls if the partition Emergency Status is set to Major Occurrence or below.
- Major Incident* Subscribers with this privilege will still be able to make and receive calls if the partition Emergency Status is set to Major Incident or below.
- Major Emergency* Subscribers with this privilege will still be able to make and receive calls if the partition Emergency Status is set to Major Emergency or below.

VLR (Visitor Location Register)

This is an information field that denotes if the subscriber is only in the VLR and not in the local CHLR (Central Home Location Register). This signifies that the subscriber's record has been obtained from a non-local HLR and that communication is required to the CHLR.

NOTE: If creating a new subscriber, this should remain unticked.

Account Suspended

From the drop-down list, select the required option below.

- Not Suspended* The account is free from suspension and will work normally.
- Suspended, Account Barred* The subscriber will not be able to register to the network and therefore cannot make, or receive, calls (or SMS messages) through PMX.
- Suspended, Access Restricted* If this option is selected, the subscriber's phone will be allowed to register to the network, but all Mobile Originated calls (and SMS messages) will be routed to the destination specified in the corresponding Destination Route (i.e. Account Suspended or Account Suspended SMS Route).
NOTE: There may be separate routes defined for calls and SMS messages.



Call Intercept Enabled	This option allows all calls to / from this subscriber to be routed via a SIP 'entity', in order to perform call recording / call intercept.
Display Text	Enter the text that will be displayed on the recipient's phone when this subscriber rings them, if the called party has CNAP (Calling Name Presentation) provisioned.
Presentation CLI	Enter the Calling Line Identity (CLI) number that will be presented when making a call. This overrides the extension number which would normally be sent as the CLI. This is optional.
Telephony	If the subscriber will be allowed to make telephone calls, tick this box. By default, this is enabled.
SMS-MT (Short Message Service – Mobile Terminated)	Ticking this box will allow this subscriber to receive SMS messages. It will be ticked (i.e. enabled) by default.
SMS-MO (Short Message Service – Message Originated)	Ticking this box will allow this subscriber to send SMS messages. It will be ticked (i.e. enabled) by default.
Force Out	If this box is ticked, it will force all calls made by this subscriber through the SIP gateway, regardless of the destination (i.e. even if the call is between two handsets on the same private network).

- Once complete, click **Submit** (or click **Cancel** to abort the process).

Once submitted, you will be returned to the **Subscriber** screen and the newly-created subscriber will be listed.

Edit Subscriber

To edit the settings for an existing subscriber:

- From the **Subscribers** screen, select the subscriber you want to edit from the list.
- Once highlighted, click **Edit Subscriber** from the left-hand menu.
- The following dialog will be displayed.



Edit Subscriber

IMSI	<input type="text" value="345342425456231"/>
Description	<input type="text" value="Pierre Menn"/>
SIP Registration Enabled	<input type="checkbox"/>
SIP Password	<input type="text"/>
Number	<input type="text"/>
TON	<input type="text" value="National (0x81)"/>
	0x <input type="text"/>
DDI	<input type="text"/>
External Mobile Network No.	<input type="text"/>
Profile	<input type="text" value="Normal Subscriber"/>
Emergency Privilege	<input type="text" value="None"/>
VLR	<input type="checkbox"/>
Account Suspended	<input type="text" value="Not Suspended"/>
Display Text	<input type="text"/>
Presentation CLI	<input type="text"/>
Telephony	<input checked="" type="checkbox"/>
SMS-MT	<input checked="" type="checkbox"/>
SMS-MO	<input checked="" type="checkbox"/>
Force Out	<input type="checkbox"/>

- Edit the relevant fields as required.
- Once amended, click **Submit** (or click **Cancel** to abort the process).

Once submitted, any changes will be saved and you will be returned to the **Subscribers** screen. To edit further subscribers, repeat the process detailed above.

Delete Subscriber

Once subscribers have been added to the system, if they are no longer needed, then they can be deleted.

To delete an existing subscriber:

- From the **Subscribers** screen, select the subscriber(s) you want to delete.
NOTE: To select multiple subscribers, use the checkboxes adjacent to each record.
- Once highlighted, click **Delete Subscriber** from the left-hand menu (as shown above).
- The following dialog box will be displayed.



- Click **OK** to confirm deletion (or click **Cancel** to abort the process).

Once confirmed, you will be returned to the **Subscribers** screen and the selected subscriber(s) will have been removed from the selected partition.

Edit Authentication Settings

This section is designed to determine whether or not authentication will be used for this subscriber. If enabled, authentication will be used for the situations preset at partition level. If authentication is set to anything other than **None** or a **HTTP Connection**, then the K_i value must be known in order to use authentication. If the K_i is to be held off the system (i.e. not in the local HLR database then a HTTP connection may be used in order to achieve authentication.

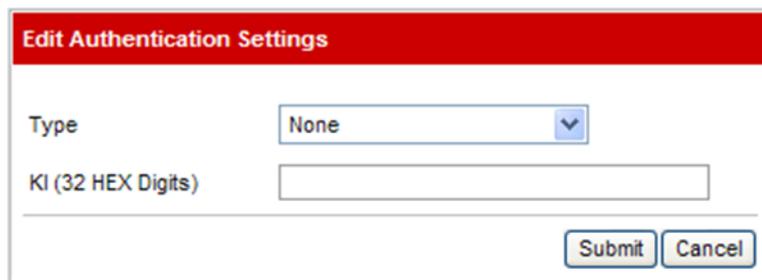
Under this authentication method, your PMN system will request authentication vectors via 1 of 10 possible HTTP connections and use these to authenticate to subscriber's SIM.

NOTE: For VLR subscribers, authentication is set to use HTTP, but for such users this results in using a T-MAP connection to a CHLR.

- Select the subscriber you wish to edit by clicking on them.

NOTE: Only one subscriber's authentication settings can be edited at one time.

- Once highlighted, click **Edit Authentication Settings** from the left-hand menu.
- The following dialog box will be displayed.



- Once complete, click **Submit** (or click **Cancel** to abort the process).

Type	Sets the authentication algorithm used on the SIM card. Select the required authentication type from the dropdown list.
<i>None</i>	No algorithm is used.
<i>XOR</i>	Simple eXclusive OR algorithm implemented on certain test SIMs
<i>Milenage</i>	GSM Milenage (the 2G version of the 3G algorithm) as specified by the 3GPP standard.
<i>GSM-A</i>	The GSM Association's COMP128-2 algorithm (only available to GSM-A members)
<i>HTTP Connection 0-9</i>	NOTE: Where HTTP is used, a K_i value



KI (32 HEX Digits)

(below) need not be entered.

Enter the K_i code. This is a code programmed on the SIM used in authenticating SIMs on the mobile network. The K_i cannot be determined by a card reader and ensures that a ghosted SIM is not being used.

This field can be left blank if the **Type** field (above) is set as **None** or any of the 10 **HTTP Connection** fields.

NOTE: For 3rd party SIMs such as those already supplied by a macro network provider, the K_i will be unknown to PMX and authentication will not be possible, unless performed via MAP with the network operator's Authentication centre. Where the SIM has been supplied by PMX, the K_i will be known and usable as it is programmed by PMX.

- Once complete, click **Submit** (or click **Cancel** to abort the process).

Once submitted, you will be returned to the **Subscribers** screen. To edit the authentication for another subscriber, repeat the process above.

Edit GPRS Settings

The PMX system can allow GPRS-enabled handsets to access data services. As part of the provisioning process, the relevant settings can be configured on each individual extension. To edit GPRS (General Packet Radio Service) settings:

- Select the subscriber from the list.
NOTE: Only one subscriber's GPRS settings can be edited at one time.
- Once highlighted, click **Edit GPRS Settings** from the left-hand menu.
- The following screen will be displayed.

- Complete / edit the relevant fields as detailed below.

Enable GPRS

To allow the subscriber to access GPRS services this box must be ticked.



VPLMN Address Allowed Dynamic IP

NOTE: All other settings will be disabled until this is enabled.

Allows an IP address assigned by another network to be used within PMX.

Ticking this box will assign the subscriber a dynamic IP address. This may change from one registration to the next. When enabled, the **IP Address** field below will be disabled.

IP Address

If the **Dynamic IP** field above remains un-ticked, this will determine that the subscriber will be assigned a static IP address, i.e. it will be the same for every registration. If this is the case, the IP address should be entered here.

NOTE: If the **Dynamic IP** field above is checked, this field becomes unavailable.

Access Point Name

Enter the name of the Access Point you wish the subscriber to be able to access. This will be determined by the GPRS setting on the subscriber's handset.

NOTE: The default input is '*'. This allows the device to use any Access Point Name configured in the GPRS Support Node (GSN).

Reliability Class

This sets the required level of reliability when sending and receiving GPRS data. The values determine whether sent data should be acknowledged and whether or not the transmission deals with data loss. There is a trade-off between speed and reliability i.e. the faster the transmission; the less the quality of the data can be guaranteed.

The Reliability Class specifies the requirements of the various network protocols layers. The combinations of the GTP, LLC and RLC transmission modes support the reliability class performance requirements.

Acknowledged GTP, LLC and RLC; Protected Data Class 1 – Non real-time network traffic, error-sensitive application that cannot cope with data loss.

Unacknowledged GTP, Acknowledged LLC and RLC; Protected Data Class 2 – Non real-time network traffic, error-sensitive application that can cope with infrequent data loss.

Unacknowledged GTP and LLC, Acknowledged RLC; Protected Data Class 3 – Non real-time traffic, error-sensitive application that can cope with data loss, GMM / SM and SMS.

NOTE: This is the default setting.

Unacknowledged GTP, LLC and RLC; Protected Data Class 4 – Real-time traffic, error-sensitive application that can cope with data loss.

Unacknowledged GTP, LLC and RLC; Unprotected Data Class 5 – Real-time traffic, error non-sensitive application that can cope with data loss.

Delay Class

Sets the level of artificial latency on data transmission.

1 Class 1

2 Class 2

3 Class 3

4 – *Best Effort* Class 4. Data will be transmitted as quickly as current network conditions



allow (default setting).

Precedence Class

Allows the GPRS data for this subscriber to be given a priority higher/lower than the data of other users. Under normal operating conditions, the network will attempt to meet the service commitments of all Quality of Service (QoS) profiles.

High Data to this subscriber will be given a high priority over other subscribers (i.e. precedence over those with a 'Normal' or 'Low' setting).

Normal Data to this subscriber will be given a normal priority over other subscribers (i.e. those with the 'Low' setting below).

NOTE: This is the default setting.

Low Data to this subscriber will be given a low priority over other subscribers.

Peak Throughput

This option provides a throttle for the subscriber's data by setting the fastest rate at which data may be transmitted (measured in octets per second).

- 1000 Class 1 – 8 kbit/s
- 2000 Class 2 – 16 kbit/s
- 4000 Class 3 – 32 kbit/s
- 8000 Class 4 – 64 kbit/s
- 16000 Class 5 – 128 kbit/s
- 32000 Class 6 – 256 kbit/s
- 64000 Class 7 – 512 kbit/s
- 128000 Class 8 – 1024 kbit/s
- 256000 Class 9 – 2048 kbit/s

Mean Throughput

Set the maximum amount of data which may be transmitted by the extension (measured in bytes per hour). For example, selecting **5000** would mean that you are allowed up to 5000 octets per hour at the rate specified by the **Peak Throughput** field above. If all the data is used in the first 5 minutes, there would be no more data available for 55 mins.

NOTE: If left as **Best Effort** (default) as much data as current network conditions allow will be transmitted (measured in octets per hour).

- 100 Class 1 – ~0.22 bit/s
- 200 Class 2 – ~0.44 bit/s
- 500 Class 3 – ~1.11 bit/s
- 1000 Class 4 – ~2.2 bit/s
- 2000 Class 5 – ~4.4 bit/s
- 5000 Class 6 – ~11.1 bit/s
- 10000 Class 7 – ~22 bit/s
- 20000 Class 8 – ~44 bit/s
- 50000 Class 9 – ~111 bit/s
- 100000 Class 10 – ~0.22 kbit/s
- 200000 Class 11 – ~0.44 kbit/s
- 500000 Class 12 – ~1.11 kbit/s
- 1000000 Class 13 – ~2.2 kbit/s
- 2000000 Class 14 – ~4.4 kbit/s
- 5000000 Class 15 – ~11.1 kbit/s
- 10000000 Class 16 – ~22 kbit/s
- 20000000 Class 17 – ~44 kbit/s
- 50000000 Class 18 – ~111 kbit/s
- Best Effort* Class 31 – Best effort

- Once complete, click **Submit** (or click **Cancel** to abort the process).



Once submitted, changes will be saved and you will be returned to the **Subscribers** screen.

Edit ODB Settings

Operator Determined Barring (ODB), and its associated settings, offers the PMX Administrator the ability to regulate access by subscribers to GSM services by the barring of certain categories of outgoing traffic.

In most situations, ODB will not be applicable. Barring of calls may be achieved by the PMX routes or by restrictions on the network beyond the PMX gateway. It may be required, however, where the PMX system links up with other network providers under roaming arrangements.

NOTE: Operator Determined Barring does **not** apply to Emergency Calls.

To edit ODB settings:

- From the **Subscribers** screen, select the subscriber you wish to edit from the list.
NOTE: Only one subscriber can be edited at one time.
- Once highlighted, click **Edit ODB Settings** from the left-hand menu.
- The following dialog box will be displayed.

Setting	Checkbox
Enabled	<input type="checkbox"/>
All Outgoing Calls Barred	<input type="checkbox"/>
International Outgoing Calls Barred	<input type="checkbox"/>
International Outgoing Calls Barred (except to home country)	<input type="checkbox"/>
Premium Rate Information Barred	<input type="checkbox"/>
Premium Rate Entertainment Barred	<input type="checkbox"/>
Supplementary Services Access Barred	<input type="checkbox"/>
All Call Transfers Barred	<input type="checkbox"/>

Submit Cancel

- Complete the fields are detailed below.

Enabled

Ticking this box determines whether or not Operator Determined Barring (ODB) will be enabled for this subscriber. ODB allows PMX to bar calls from the subscriber's extension to certain number types, such as international or premium rate numbers. If ticked, the settings below may need to be configured.

All Outgoing Calls Barred

If this box is ticked, the subscriber will not be allowed to make any outgoing calls, or send any SMS messages, from their handset.

NOTE: They will still be allowed to receive calls and SMS messages.

International Outgoing Calls Barred

Ticking this box will prohibit the subscriber from dialling numbers, or sending SMS messages, to international destinations.



International Outgoing Calls Barred (except to home country)	Ticking this box will prohibit the subscriber from dialling numbers, or sending SMS messages, to international destinations other than to numbers within their 'Home' country.
Premium Rate Information Barred	If ticked, this will bar the subscriber from dialling any numbers prefixed in the Premium Prefixes section that have been identified as <i>Information</i> . NOTE: For more information on this option, see earlier section entitled <i>Premium Prefixes</i> .
Premium Rate Entertainment Barred	If ticked, this will bar the subscriber from dialling any numbers prefixed in the Premium Prefixes section that have been identified as <i>Entertainment</i> . NOTE: For more information on this option, see earlier section entitled <i>Premium Prefixes</i> .
Supplementary Services Access Barred	If ticked, this will prevent user control of any supplementary services (e.g. registration, erasure, activation, deactivation, user invocation (i.e. call hold), interrogation of mobile initiated USSD). NOTE: This does not prevent invocation by other action, e.g. an existing call forwarding state will remain.
All Call Transfers Barred	Prevents the subscriber from initiating a call transfer.

- Once complete, click **Submit** (click **Cancel** to abort the process).

Once submitted, you will be returned to the **Subscribers** screen. To edit settings for other subscribers, repeat the process detailed above.

Edit Supplementary Services

Supplementary Services (SS) in GSM are a means of enriching the user experience. A supplementary service may, for example forward a call in the case of no reply from the called party, bar certain outgoing or incoming calls show the number of the calling party to the called party, etc.

General Tab

The Supplementary Services consists of two tabs, detailing **General** information on one tab and the second containing **Divert** settings.



Supplementary Services

General

Diverts

Name Identification

CNAP Not Provisioned ▼

Call Completion

Hold

Call Waiting Disabled ▼

Number Identification

CLIP Override Disabled ▼

CLIR Permenant CLIR ▼

COLP Override Disabled ▼

COLR Provisioned ▼

Transfer

Transfer

Submit
Cancel

- Complete the relevant fields as detailed.

Name Identification

CNAP (Calling Name Presentation)	<p>Calling Name Presentation controls the presentation of Calling Name ID to the user.</p> <p>NOTE: The GSM handset must be capable of CNAP for the name to be displayed.</p> <p><i>Not Provisioned</i></p> <p><i>Override Disabled</i></p> <p><i>Override Enabled</i></p>	<p>User will not be presented with the Calling Name, if available.</p> <p>User will be presented with the Calling Name, if available.</p> <p>User will be presented with the Calling Name of the caller, however, if the local calling user has CLIR enabled, this will be overridden.</p>
---	---	--

Call Completion

Hold	Controls the ability to place a call on hold and retrieve them.
Call Waiting	When a subscriber is in a connected call, this allows a further Mobile Terminated call to be presented to the user.
	<i>Not Provisioned</i> Call Waiting service is not



<i>Disabled</i>	available.
<i>Enabled</i>	Call Waiting service is available, but not active.
	Call Waiting service is available and active.

Number Identification

CLIP (Calling Line Identification Presentation)	This controls the presentation of the CLI to the subscriber.	
	<i>Not Provisioned</i>	User will not be presented with the CLI of the caller.
	<i>Override Disabled</i>	User will be presented with the CLI of the caller.
	<i>Override Enabled</i>	User will be presented with the CLI of the caller. However, if the local calling party has CLIR enabled, then this will be overridden.
CLIR (Calling Line Restriction)	This controls the restriction of Calling Line ID to the called party.	
	<i>Not Provisioned</i>	User cannot restrict CLI.
	<i>Permanent CLIR</i>	CLI is permanently restricted.
	<i>Temp, Default CLI Restricted</i>	Default is for CLI to be restricted but can be overridden by the subscriber.
	<i>Temp, Default CLI Allowed</i>	Default is for it <u>not</u> to be restricted but can be overridden by the subscriber.
COLP (Connected Line Identification Presentation)	COLP controls the presentation of the connected party's ID.	
	<i>Not Provisioned</i>	User will not be presented with the Connected Line ID.
	<i>Override Disabled</i>	User will be presented with Connected Line ID.
	<i>Override Enabled</i>	User will be presented with Connected Line ID however, if the local connected party has COLR enabled then this will be overridden.
COLR (Connected Line Identity Restriction)	This option controls the restriction of the connected party's line ID.	
	<i>Not Provisioned</i>	The user can not restrict Connected Line ID.
	<i>Provisioned</i>	The user can restrict Connected Line ID.

Transfer

Transfer This option controls the ability for the subscriber to initiate a call transfer.

- Once complete, click **Submit** (or click **Cancel** to abort the process).

Once submitted, any changes will be saved and you will be returned to the **Subscribers** screen. To edit the settings for other subscribers, repeat the process detailed above.

Diverts Tab

There may be a requirement to forward / divert calls to other destinations under certain conditions. You may, for example, wish to divert calls to a voicemail system or a switchboard if a subscriber is busy. These diverts can either be set at partition level, i.e. all extensions



within the partition will follow the same diverts or they may be set on individual subscribers as described below.

For more information on partition level diverts, please refer to the earlier section entitled *Edit Divert Settings*.

NOTE: Subscriber diverts will take precedence over Partition diverts.

The screenshot shows the 'Supplementary Services' configuration window with the 'Diverts' tab selected. It contains four divert configuration panels: 'All Calls', 'Busy', 'No Answer', and 'Not Reachable'. Each panel includes an 'Active' checkbox, a 'Number' field, a 'Type of Number' dropdown (currently set to 'National (0x81)'), and an '0x' checkbox. The 'No Answer' panel also has a 'Timeout (secs)' field. A 'User Settings' section at the bottom has an 'Allow user to alter diverts' checkbox. 'Submit' and 'Cancel' buttons are at the bottom right.

- Edit the relevant fields as detailed below

NOTE: Against each divert type is a tick box labelled 'Active'. When ticked, that adjacent divert will become active and, when un-ticked, the divert destination will remain, but the divert will no longer be active.

All Calls

Otherwise known as an 'unconditional' or 'immediate' divert, the number defined in this field will be called under all circumstances. This divert, once activated, will take precedence over all other divert types.

To activate this divert:

- Tick the **Active** box.
- Add the number you want to divert to in the **Number** field.
- Define this type of number from the drop-down bow. This field is used to describe the type of extension number in the field selected above.

NOTE: Usually the number will be a National (0x81) number.

No Answer



Sets an alternative point of answer when calls give no reply within the ringing duration set in 'Timeout'.

To active this divert:

- Tick the **Active** box.
- Add the number you want to divert to in the **Number** field.
- Define this type of number from the drop-down bow. This field is used to describe the type of extension number in the field selected above.

NOTE: Usually the number will be a National (0x81) number.

- Define the number of seconds the system will wait for an answer from the extension before following the 'No Answer' divert to the defined number.

Busy

Allows an alternative point of answer to be defined when the extension is busy on another call and no second line is enabled on the extension / handset.

To active this divert:

- Tick the **Active** box.
- Add the number you want to divert to in the **Number** field.
- Define this type of number from the drop-down bow. This field is used to describe the type of extension number in the field selected above.

NOTE: Usually the number will be a National (0x81) number.

Not Reachable

In circumstances where it can no longer be established that the extension is registered on the system i.e. the handset is switched off, is no longer within range of an access point or has roamed to another network, the system will divert calls to the number defined here.

To active this divert:

- Tick the **Active** box.
- Add the number you want to divert to in the **Number** field.
- Define this type of number from the drop-down bow. This field is used to describe the type of extension number in the field selected above.

NOTE: Usually the number will be a National (0x81) number.

User Settings

The diverts set on this tab may be defined exclusively by the administrator, in which case this box should remain un-ticked, or you may wish to tick the box in order to allow divert commands from handsets to update the divert destinations.

NOTE: This is only applicable for non-VLR subscribers.

To active this divert:

- Tick the **Allow user to alter diverts** box.

NOTE: The other diverts set on this tab may be defined exclusively by the PMX Administrator, in which case this box should remain un-ticked. However, you may wish to tick the box in order to allow divert commands from the subscriber's handset to update the divert destinations.

- Once complete, click **Submit** (or click **Cancel** to abort the process).

Once submitted, any changes will be saved and you will be returned to the **Subscribers** screen. To edit the settings for other subscribers, repeat the process detailed above.



Hunt Group

A **Hunt Group** allows a caller ringing a number to automatically find an available subscriber from amongst a group of subscribers within the same group. Each subscriber will be tried in the order list until a free extension is reached.

The subscribers listed will not be tried if they are currently on a call and / or not registered on the network.

To access the Hunt Group settings:

- From the **Subscribers** screen, click **Hunt Group** from the left hand-menu.
- The following screen will be displayed.

This screen will also include specific menu options for managing the Hunt Groups. These options can be navigated by using the clicking the relevant link from the left-hand side menu (see above).

These links will be required, and referenced, for the additional options described below.

Create Number

To create a Hunt Group number:

- From the **Hunt Group** screen, click **Create Number** from the left-hand menu.
- The following dialog box will be displayed.

- Enter a number for the group in the **Number** field above.
- Once added, click **Submit** (or click **Cancel** to abort the process).

Once submitted, you will be returned to the **Hunt Group** screen and the newly-created number will be displayed.

Delete Number

To delete a number from the Hunt Group:

- From the **Hunt Group** screen, select the Number(s) you want to delete from the list.
- Once highlighted, click **Delete Number** from the left-hand menu.



- The following dialog box will be displayed.



- To confirm deletion click **Ok** (or click **Cancel** to abort the process).

Once confirmed, you will be returned to the **Hunt Group** screen and the selected number(s) will have been deleted.

Move Up / Down

The **Move Up** or **Move Down** options will help to adjust the order that the subscribers will be rung within the group.

- From the **Hunt Group** screen, select a number from the list.
- Once highlighted, click **Move Up** (or **Move Down** as applicable) to adjust the order on the screen.
- Numbers can be selected and re-ordered until you are happy with the ringing order.

There is no need to 'save' any settings as they will work in the order they have been set.

Edit Settings

To edit the Hunt Group settings:

- From the **Hunt Group** screen, select the groups you want to edit from the list.
- Once highlighted, click **Edit Settings** from the left-hand menu.
- The following dialog box will be displayed.

- Complete the fields as detailed below.

- | | |
|------------------------|---|
| Description | Enter a description in the field.
NOTE: This is a required field. |
| Enabled | Tick this box to enable / disable this Hunt Group. |
| Ring Subscriber | Specifies whether the subscriber will be rung first or not. |



Ring Time (secs)

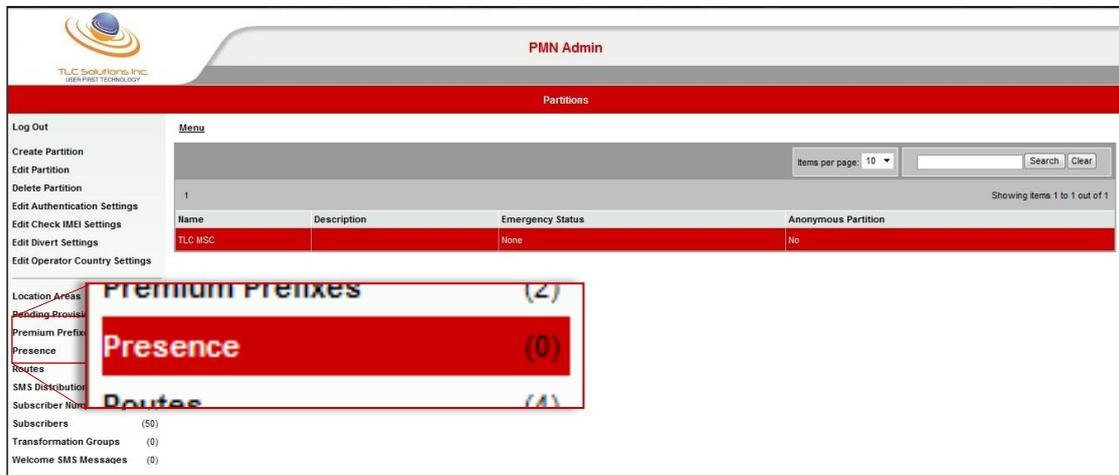
Enter the number of seconds for how long each subscriber will be rung before moving onto the next number (maximum of 30 seconds).

NOTE: The default of 10 seconds can be changed if required.

Presence

Once subscribers have been fully provisioned (as opposed to pending) on the system, the **Presence** feature allows the PMX Administrator to see the status of those subscribers.

Each currently registered subscriber will appear in a list of users within the selected partition (see below).

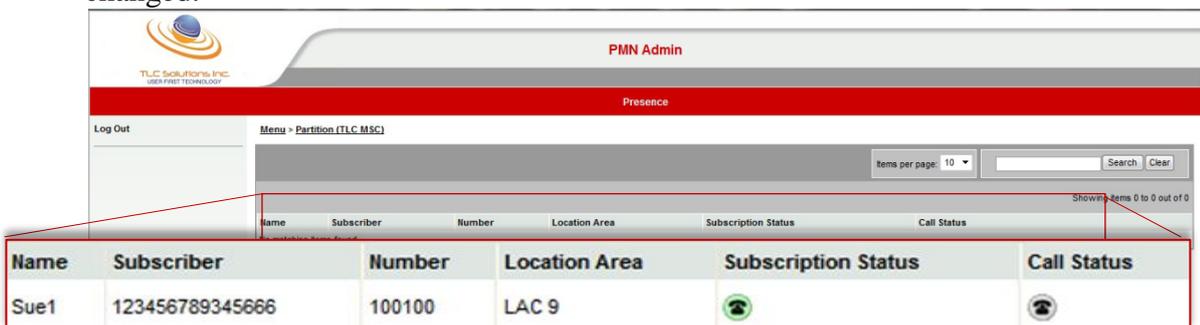


If any handsets are currently registered on the system then you will be able to see how many exist from the left-hand side menu. In the example shown above, 0 handsets have their presence status available within the selected Derwent Water partition.

To access the Presence screen:

- From the **Partition** screen, click **Presence** from the left-hand menu (see above).
- The following screen will be displayed. This is the **Presence** screen.

The Presence screen is purely for information and the details displayed cannot be changed.





NOTE: This screen does not update in real time. To get the most up-to-date view, click the **Refresh** button on your browser.

Each subscriber's extension and number will appear in a list of registered numbers within the selected partition along with their name, the Location Area the subscriber is currently in and their subscription and call status.

The icons displayed under the **Subscription Status** and **Call Status** columns visually indicate each subscriber's current state and as explained below.

While the icons are the same, their meaning is dependent on whether they are displayed in the **Subscription** or **Call Status** columns.

Subscription Status		Call Status
Registered on the network		N/A
N/A		On Call
Not currently registered to the network (won't be displayed)		Not on a call

NOTE: Once complete, navigation away from this screen needs to be done via the Breadcrumb menu along the top of the screen.



SMS Distribution Groups

As a PMX System Administrator, you may create SMS Distribution Groups within a partition and then send all subscriber's in that group the same SMS text message(s).

You will be able to view a list of SMS Distribution Groups associated to a particular partition by clicking a particular partition from the Partitions screen (see below).

Name	Description	Emergency Status	Anonymous Partition
TLC MSC		None	No

If any Distribution Groups have been set up already within that partition, then you will be able to see how many exist from the left-hand side menu. In the example shown above, 2 SMS Distribution Groups already exist within the selected Derwent Water partition.

To see the list of Distribution Groups (even if there are none):

- From the **Partitions** screen, select the relevant partition from the list.
- Once highlighted, click the **SMS Distribution Groups** link (as shown above).
- This will take you into the **SMS Distribution Groups** page (see below). Any existing groups will be displayed in the list (see below).

NOTE: If this is a new partition, the list will be blank.

Select	Items per page
None	10

This screen will also include specific menu options for managing the routes within each partition. These options can be navigated by using the clicking the relevant option from the left-hand side menu (see left). These links will



be required, and referenced, for the additional options described below.

Create SMS Distribution Group

To create a new SMS Distribution Group from the **SMS Distribution Groups** list:

- From the **SMS Distribution Groups** screen, click **Create SMS Distribution Groups** from the left-hand menu.
- The **SMS Distribution Groups** screen will be displayed.
- Click **Create SMS Distribution Group** from the menu (shown above).
- The following dialog box will be displayed.

The dialog box has a red title bar with the text "Create SMS Distribution Group". Below the title bar is a text input field with the label "Name". At the bottom right of the dialog box are two buttons: "Submit" and "Cancel".

- Add a descriptive name for the group you are creating in the **Name** field (above).
- Once complete, click **Submit** (or **Cancel** to abort the creation process).
- The newly created group will now appear in the list of SMS Distribution Groups displayed.

Once the group has been created, it needs to be populated with subscribers who will be added to the group and will receive the SMS messages sent to this group. For more information on adding subscribers to your SMS Distribution Group, please refer to the *Subscribers* section later in this chapter.

Edit SMS Distribution Group

This option allows you to amend the name of a particular SMS Distribution Group. To edit a SMS Distribution Group:

- From the **SMS Distribution Groups** screen, select the group you wish to edit from the list by clicking it (see below).
- NOTE:** The checkbox next to the name does not have to be 'ticked' but the group must be highlighted for it to be selected. Only one group name can be edited at one time.
- Click **Edit SMS Distribution Group** from the left-hand menu.
 - The following dialog box will be displayed.

The dialog box has a red title bar with the text "Edit SMS Distribution Group". Below the title bar is a text input field with the label "Name" and the text "Sales Team" inside. At the bottom right of the dialog box are two buttons: "Submit" and "Cancel".

- Edit the name of the group as required.
- When complete, click **Submit** (or click **Cancel** to abort the editing process).



The name of the group will now have changed within the list. If any other group names need editing, the process above can be repeated.

NOTE: If you need to edit the subscribers within a particular group then please refer to the *Subscribers* section later in this chapter.

Delete SMS Distribution Group

If, after a SMS Distribution Group has been created, it is no longer required, it can be deleted from the partition. To delete an existing group from the **SMS Distribution Groups** list:

- Select the group(s) you wish to delete from the list by clicking the checkbox adjacent to it (see below).

NOTE: If selecting only one group, the checkbox next to the name does not have to be 'ticked' but the group must be highlighted for it to be selected.

- Click **Delete SMS Distribution Groups** from the left-hand menu (as shown above).
- The following dialog box will be displayed.



- To confirm the deletion, click **Ok** (or click **Cancel** to abort the deletion process).

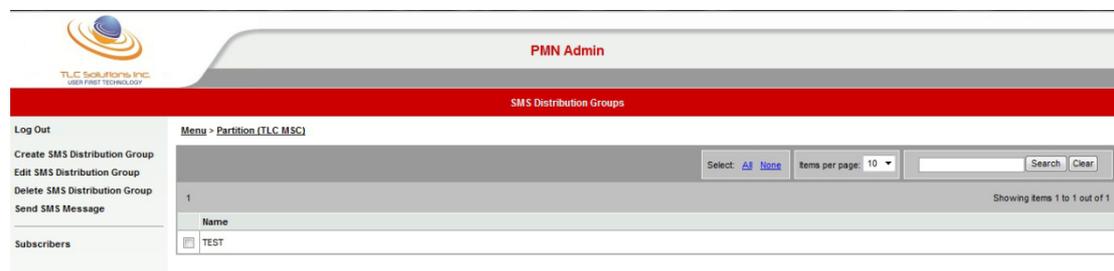
The group(s) will be permanently deleted from the system. You will be returned to the SMS Distribution Group list.

Send SMS Message

Once a SMS Distribution Group(s) has been created, and contains subscribers, then a SMS message can be sent to a selected group.

To send an SMS message to a particular group:

- Select the group you wish to send the message to from the list by clicking it (see below).



NOTE: The checkbox next to the name does not have to be 'ticked' but the group must be highlighted for it to be selected. Only one group can be sent one message at one time.

- Click **Send SMS Message** from the left-hand menu.
- The following dialog box will appear.



Send SMS Message

From

Message

Submit Cancel

- Add a name (up to 11 characters) in the **From** field. This will be displayed as the sender of the message on the recipient's phone.

NOTE: Recipients will not be able to successfully reply to messages sent with a textual value or a number which does **not** exist. If you do wish recipients to reply to the message, please ensure that you enter a valid PMX extension or macro network mobile number.

- Type the message you wish to send in the **Message** field. As per standard SMS protocol, this can be up to 160 characters (including spaces).
- Once complete, click **Submit** (or **Cancel** to abort the sending process).

You will be returned to the SMS Distribution Groups screen.



The message will be sent to the relevant distribution group and the ‘**Save Successful**’ message will be seen at the top of the screen (see above). This process can be repeated if another message needs to be sent.

Subscribers

Once SMS Distribution Groups have been set up, for subscribers to be able to receive texts they will need to be added to a group.

NOTE: Subscribers can be part of multiple groups.

To add / delete subscribers to a group:

- From the **SMS Distribution Groups** screen, select the group you wish to add subscribers to (see below).



Log Out
Create SMS Distribution Group
Edit SMS Distribution Group
Delete SMS Distribution Group
Send SMS Message
Subscribers (1)

Menu > Partition (Derwent Water)

Select: [All](#) [None](#) Items per page: 10 Search Clear

Name
<input checked="" type="checkbox"/> Sales Team
<input type="checkbox"/> Training Team

Showing items 1 to 2 out of 2

- Once the group has been selected, you can see the number of existing subscribers currently part of the selected group (see above).
- Click **Subscribers** from the left-hand menu.
- The following screen will be displayed.

Log Out
Add Subscriber
Remove Subscriber

PMN Admin

Subscribers

Log Out
Add Subscriber
Remove Subscriber

Items - Partition (TLC MSC) - SMS Distribution Group (TEST)

Select: [All](#) [None](#) Items per page: 10 Search Clear

Number
4205

Showing items 1 to 2 out of 2

From this screen you can see any existing subscribers and either add, or remove, subscribers from the currently selected group by using the links from the menu (see above). For more information, please refer to the following sections.

Add Subscriber

Once the group you want has been selected, to add new subscribers to a group:

- From the **Subscribers** screen, click **Add Subscriber** from the left-hand menu.
- The following screen will be displayed. This will list all subscribers on the system not currently part of the currently selected group.

Select

Select: [All](#) [None](#) Search Clear

1 Showing items 1 to 2 out of 2

	IMSI	Name	Number	Profile	Emergency Privilege	Account Suspended
<input checked="" type="checkbox"/>	123412341234123	Terry Ware	0001	Normal Subscriber	0	Not Suspended
<input checked="" type="checkbox"/>	345342425456231	Pierre Menn	0002	Normal Subscriber	0	Not Suspended

Submit Cancel

- Select the subscriber(s) you want to add to the group by ticking the relevant checkbox adjacent to each subscriber (see above). Each selected record will be highlighted.

NOTE: It is not possible to add external mobile numbers to SMS Distribution Lists. Only PMX extensions may be selected, although if a selected handset is "off net" and



is on the 'Normal Subscriber' profile, the system will attempt to deliver messages to the 'External Mobile Network Number' defined against that particular extension (if there is one).

- Once complete, click **Submit** (or click **Cancel** if you wish to abort the process).

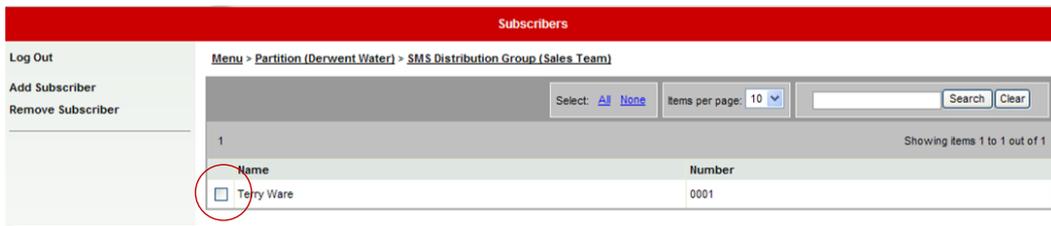
Once submitted, you will be returned to the **Subscribers** screen.

Remove Subscriber

Once the group you want has been selected, you can remove any subscriber(s) from a group that are no longer needed. With the group selected, the current subscribers in that group will be listed.

To remove a subscriber:

- Select the subscriber(s) you wish to remove from the group by checking the box(es) to the left of their name (as shown below).



- Click **Remove Subscriber** from the left-hand menu.
- The following dialog box will appear.



- Confirm the deletion by clicking **Ok** (or click **Cancel** to abort the process).
- The selected subscribers will be removed from the group.

Once confirmed, you will be returned to the **Subscribers** screen and the selected subscribers will have been removed. To delete further subscribers, repeat the process detailed above.



Section 4 - I/O Connector Pinouts

Ethernet Port

There is one (1) Ethernet port on the Laptop and one on each of the BTSs.

Pin	Wire Color	Signal
1	White Orange	TX+
2	Orange	TX-
3	White Green	RX+
4	Blue	POE
5	White Blue	POE
6	Green	RX-
7	White Brown	POE
8	Brown	POE

Ethernet Cable Pin Outs “Cross Over Cable”

Below is a pin for an Ethernet cross over cable. No Pin Out is provided for a straight through cable, because it is simply straight through.

Connector 1		Connector 2
Pin 1	→	Pin 3
Pin 2	→	Pin 6
Pin 3	→	Pin 1
Pin 4	→	Pin 4
Pin 5	→	Pin 5
Pin 6	→	Pin 2
Pin 7	→	Pin 7
Pin 8	→	Pin 8



Section 5 - dBm-to-Watts Conversion Table

dBm	Watts	dBm	Watts	dBm	Watts												
20.0	0.100	25.0	0.316	30.0	1.00	35.0	3.16	40.0	10.00	45.0	31.62	50.0	100.00	55.0	316.23	60.0	1000.00
20.1	0.102	25.1	0.324	30.1	1.02	35.1	3.24	40.1	10.23	45.1	32.36	50.1	102.33	55.1	323.59	60.1	1023.29
20.2	0.105	25.2	0.331	30.2	1.05	35.2	3.31	40.2	10.47	45.2	33.11	50.2	104.71	55.2	331.13	60.2	1047.13
20.3	0.107	25.3	0.339	30.3	1.07	35.3	3.39	40.3	10.72	45.3	33.88	50.3	107.15	55.3	338.84	60.3	1071.52
20.4	0.110	25.4	0.347	30.4	1.10	35.4	3.47	40.4	10.96	45.4	34.67	50.4	109.65	55.4	346.74	60.4	1096.48
20.5	0.112	25.5	0.355	30.5	1.12	35.5	3.55	40.5	11.22	45.5	35.48	50.5	112.20	55.5	354.81	60.5	1122.02
20.6	0.115	25.6	0.363	30.6	1.15	35.6	3.63	40.6	11.48	45.6	36.31	50.6	114.82	55.6	363.08	60.6	1148.15
20.7	0.117	25.7	0.372	30.7	1.17	35.7	3.72	40.7	11.75	45.7	37.15	50.7	117.49	55.7	371.54	60.7	1174.90
20.8	0.120	25.8	0.380	30.8	1.20	35.8	3.80	40.8	12.02	45.8	38.02	50.8	120.23	55.8	380.19	60.8	1202.26
20.9	0.123	25.9	0.389	30.9	1.23	35.9	3.89	40.9	12.30	45.9	38.90	50.9	123.03	55.9	389.05	60.9	1230.27
21.0	0.126	26.0	0.398	31.0	1.26	36.0	3.98	41.0	12.59	46.0	39.81	51.0	125.89	56.0	398.11	61.0	1258.93
21.1	0.129	26.1	0.407	31.1	1.29	36.1	4.07	41.1	12.88	46.1	40.74	51.1	128.82	56.1	407.38	61.1	1288.25
21.2	0.132	26.2	0.417	31.2	1.32	36.2	4.17	41.2	13.18	46.2	41.69	51.2	131.83	56.2	416.87	61.2	1318.26
21.3	0.135	26.3	0.427	31.3	1.35	36.3	4.27	41.3	13.49	46.3	42.66	51.3	134.90	56.3	426.58	61.3	1348.96
21.4	0.138	26.4	0.437	31.4	1.38	36.4	4.37	41.4	13.80	46.4	43.65	51.4	138.04	56.4	436.52	61.4	1380.38
21.5	0.141	26.5	0.447	31.5	1.41	36.5	4.47	41.5	14.13	46.5	44.67	51.5	141.25	56.5	446.68	61.5	1412.54
21.6	0.145	26.6	0.457	31.6	1.45	36.6	4.57	41.6	14.45	46.6	45.71	51.6	144.54	56.6	457.09	61.6	1445.44
21.7	0.148	26.7	0.468	31.7	1.48	36.7	4.68	41.7	14.79	46.7	46.77	51.7	147.91	56.7	467.74	61.7	1479.11
21.8	0.151	26.8	0.479	31.8	1.51	36.8	4.79	41.8	15.14	46.8	47.86	51.8	151.36	56.8	478.63	61.8	1513.56
21.9	0.155	26.9	0.490	31.9	1.55	36.9	4.90	41.9	15.49	46.9	48.98	51.9	154.88	56.9	489.78	61.9	1548.82
22.0	0.158	27.0	0.501	32.0	1.58	37.0	5.01	42.0	15.85	47.0	50.12	52.0	158.49	57.0	501.19	62.0	1584.89
22.1	0.162	27.1	0.513	32.1	1.62	37.1	5.13	42.1	16.22	47.1	51.29	52.1	162.18	57.1	512.86	62.1	1621.81
22.2	0.166	27.2	0.525	32.2	1.66	37.2	5.25	42.2	16.60	47.2	52.48	52.2	165.96	57.2	524.81	62.2	1659.59
22.3	0.170	27.3	0.537	32.3	1.70	37.3	5.37	42.3	16.98	47.3	53.70	52.3	169.82	57.3	537.03	62.3	1698.24
22.4	0.174	27.4	0.550	32.4	1.74	37.4	5.50	42.4	17.38	47.4	54.95	52.4	173.78	57.4	549.54	62.4	1737.80
22.5	0.178	27.5	0.562	32.5	1.78	37.5	5.62	42.5	17.78	47.5	56.23	52.5	177.83	57.5	562.34	62.5	1778.28
22.6	0.182	27.6	0.575	32.6	1.82	37.6	5.75	42.6	18.20	47.6	57.54	52.6	181.97	57.6	575.44	62.6	1819.70
22.7	0.186	27.7	0.589	32.7	1.86	37.7	5.89	42.7	18.62	47.7	58.88	52.7	186.21	57.7	588.84	62.7	1862.09
22.8	0.191	27.8	0.603	32.8	1.91	37.8	6.03	42.8	19.05	47.8	60.26	52.8	190.55	57.8	602.56	62.8	1905.46
22.9	0.195	27.9	0.617	32.9	1.95	37.9	6.17	42.9	19.50	47.9	61.66	52.9	194.98	57.9	616.60	62.9	1949.84
23.0	0.200	28.0	0.631	33.0	2.00	38.0	6.31	43.0	19.95	48.0	63.10	53.0	199.53	58.0	630.96	63.0	1995.26
23.1	0.204	28.1	0.646	33.1	2.04	38.1	6.46	43.1	20.42	48.1	64.57	53.1	204.17	58.1	645.65	63.1	2041.74
23.2	0.209	28.2	0.661	33.2	2.09	38.2	6.61	43.2	20.89	48.2	66.07	53.2	208.93	58.2	660.69	63.2	2089.30
23.3	0.214	28.3	0.676	33.3	2.14	38.3	6.76	43.3	21.38	48.3	67.61	53.3	213.80	58.3	676.08	63.3	2137.96
23.4	0.219	28.4	0.692	33.4	2.19	38.4	6.92	43.4	21.88	48.4	69.18	53.4	218.78	58.4	691.83	63.4	2187.76
23.5	0.224	28.5	0.708	33.5	2.24	38.5	7.08	43.5	22.39	48.5	70.79	53.5	223.87	58.5	707.95	63.5	2238.72
23.6	0.229	28.6	0.724	33.6	2.29	38.6	7.24	43.6	22.91	48.6	72.44	53.6	229.09	58.6	724.44	63.6	2290.87
23.7	0.234	28.7	0.741	33.7	2.34	38.7	7.41	43.7	23.44	48.7	74.13	53.7	234.42	58.7	741.31	63.7	2344.23
23.8	0.240	28.8	0.759	33.8	2.40	38.8	7.59	43.8	23.99	48.8	75.86	53.8	239.88	58.8	758.58	63.8	2398.83
23.9	0.245	28.9	0.776	33.9	2.45	38.9	7.76	43.9	24.55	48.9	77.62	53.9	245.47	58.9	776.25	63.9	2454.71
24.0	0.251	29.0	0.794	34.0	2.51	39.0	7.94	44.0	25.12	49.0	79.43	54.0	251.19	59.0	794.33	64.0	2511.89



dBm	Watts																
24.1	0.257	29.1	0.813	34.1	2.57	39.1	8.13	44.1	25.70	49.1	81.28	54.1	257.04	59.1	812.83	64.1	2570.40
24.2	0.263	29.2	0.832	34.2	2.63	39.2	8.32	44.2	26.30	49.2	83.18	54.2	263.03	59.2	831.76	64.2	2630.27
24.3	0.269	29.3	0.851	34.3	2.69	39.3	8.51	44.3	26.92	49.3	85.11	54.3	269.15	59.3	851.14	64.3	2691.53
24.4	0.275	29.4	0.871	34.4	2.75	39.4	8.71	44.4	27.54	49.4	87.10	54.4	275.42	59.4	870.96	64.4	2754.23
24.5	0.282	29.5	0.891	34.5	2.82	39.5	8.91	44.5	28.18	49.5	89.13	54.5	281.84	59.5	891.25	64.5	2818.38
24.6	0.288	29.6	0.912	34.6	2.88	39.6	9.12	44.6	28.84	49.6	91.20	54.6	288.40	59.6	912.01	64.6	2884.03
24.7	0.295	29.7	0.933	34.7	2.95	39.7	9.33	44.7	29.51	49.7	93.33	54.7	295.12	59.7	933.25	64.7	2951.21
24.8	0.302	29.8	0.955	34.8	3.02	39.8	9.55	44.8	30.20	49.8	95.50	54.8	302.00	59.8	954.99	64.8	3019.95
24.9	0.309	29.9	0.977	34.9	3.09	39.9	9.77	44.9	30.90	49.9	97.72	54.9	309.03	59.9	977.24	64.9	3090.30



Section 6 - ARFCN Frequencies

F-1. GSM-850 ARFCN Frequencies (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
128	824.200	869.200	166	831.800	876.800	204	839.400	884.400
129	824.400	869.400	167	832.000	877.000	205	839.600	884.600
130	824.600	869.600	168	832.200	877.200	206	839.800	884.800
131	824.800	869.800	169	832.400	877.400	207	840.000	885.000
132	825.000	870.000	170	832.600	877.600	208	840.200	885.200
133	825.200	870.200	171	832.800	877.800	208	840.400	885.400
134	825.400	870.400	172	833.000	878.000	210	840.600	885.600
135	825.600	870.600	173	833.200	878.200	211	840.800	885.800
136	825.800	870.800	174	833.400	878.400	212	841.000	886.000
137	826.000	871.000	175	833.600	878.600	213	841.200	886.200
138	826.200	871.200	176	833.800	878.800	214	841.400	886.400
139	826.400	871.400	177	834.000	879.000	215	841.600	886.600
140	826.600	871.600	178	834.200	879.200	216	841.800	886.800
141	826.800	871.800	179	834.400	879.400	217	842.000	887.000
142	827.000	872.000	180	834.600	879.600	218	842.200	887.200
143	827.200	872.200	181	834.800	879.800	219	842.400	887.400
144	827.400	872.400	182	835.000	880.000	220	842.600	887.600
145	827.600	872.600	183	835.200	880.200	221	842.800	887.800
146	827.800	872.800	184	835.400	880.400	222	843.000	888.000
147	828.000	873.000	185	835.600	880.600	223	843.200	888.200
148	828.200	873.200	186	835.800	880.800	224	843.400	888.400
149	828.400	873.400	187	836.000	881.000	225	843.600	888.600
150	828.600	873.600	188	836.200	881.200	226	843.800	888.800
151	828.800	873.800	189	836.400	881.400	227	844.000	889.000
152	829.000	874.000	190	836.600	881.600	228	844.200	889.200
153	829.200	874.200	191	836.800	881.800	229	844.400	889.400
154	829.400	874.400	192	837.000	882.000	230	844.600	889.600
155	829.600	874.600	193	837.200	882.200	231	844.800	889.800
156	829.800	874.800	194	837.400	882.400	232	845.000	890.000
157	830.000	875.000	195	837.600	882.600	233	845.200	890.200
158	830.200	875.200	196	837.800	882.800	234	845.400	890.400
159	830.400	875.400	197	838.000	883.000	235	845.600	890.600
160	830.600	875.600	198	838.200	883.200	236	845.800	890.800
161	830.800	875.800	199	838.400	883.400	237	846.000	891.000
162	831.000	876.000	200	838.600	883.600	238	846.200	891.200
163	831.200	876.200	201	838.800	883.800	239	846.400	891.400
164	831.400	876.400	202	839.000	884.000	240	846.600	891.600
165	831.600	876.600	203	839.200	884.200	241	846.800	891.800
242	847.000	892.000	246	847.800	892.800	250	848.600	893.600
243	847.200	892.200	247	848.000	893.000	251	848.800	893.800



ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
244	847.400	892.400	248	848.200	893.200	251	847.000	892.000
245	847.600	892.600	249	848.400	893.400	---	---	---



F-2. E-GSM-900 ARFCN Frequencies (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
0	890.000	935.000	30	896.000	941.000	60	902.000	947.000
1	890.200	935.200	31	896.200	941.200	61	902.200	947.200
2	890.400	935.400	32	896.400	941.400	62	902.400	947.400
3	890.600	935.600	33	896.600	941.600	63	902.600	947.600
4	890.800	935.800	34	896.800	941.800	64	902.800	947.800
5	891.000	936.000	35	897.000	942.000	65	903.000	948.000
6	891.200	936.200	36	897.200	942.200	66	903.200	948.200
7	891.400	936.400	37	897.400	942.400	67	903.400	948.400
8	891.600	936.600	38	897.600	942.600	68	903.600	948.600
9	891.800	936.800	39	897.800	942.800	69	903.800	948.800
10	892.000	937.000	40	898.000	943.000	70	904.000	949.000
11	892.200	937.200	41	898.200	943.200	71	904.200	949.200
12	892.400	937.400	42	898.400	943.400	72	904.400	949.400
13	892.600	937.600	43	898.600	943.600	73	904.600	949.600
14	892.800	937.800	44	898.800	943.800	74	904.800	949.800
15	893.000	938.000	45	899.000	944.000	75	905.000	950.000
16	893.200	938.200	46	899.200	944.200	76	905.200	950.200
17	893.400	938.400	47	899.400	944.400	77	905.400	950.400
18	893.600	938.600	48	899.600	944.600	78	905.600	950.600
19	893.800	938.800	49	899.800	944.800	79	905.800	950.800
20	894.000	939.000	50	900.000	945.000	80	906.000	951.000
21	894.200	939.200	51	900.200	945.200	81	906.200	951.200
22	894.400	939.400	52	900.400	945.400	82	906.400	951.400
23	894.600	939.600	53	900.600	945.600	83	906.600	951.600
24	894.800	939.800	54	900.800	945.800	84	906.800	951.800
25	895.000	940.000	55	901.000	946.000	85	907.000	952.000
26	895.200	940.200	56	901.200	946.200	86	907.200	952.200
27	895.400	940.400	57	901.400	946.400	87	907.400	952.400
28	895.600	940.600	58	901.600	946.600	88	907.600	952.600
29	895.800	940.800	59	901.800	946.800	89	907.800	952.800
						90	908.000	953.000



ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
91	908.200	953.200	103	910.600	955.600	115	913.000	958.000
92	908.400	953.400	104	910.800	955.800	116	913.200	958.200
93	908.600	953.600	105	911.000	956.000	117	913.400	958.400
94	908.800	953.800	106	911.200	956.200	118	913.600	958.600
95	909.000	954.000	107	911.400	956.400	119	913.800	958.800
96	909.200	954.200	108	911.600	956.600	120	914.000	959.000
97	909.400	954.400	109	911.800	956.800	121	914.200	959.200
98	909.600	954.600	110	912.000	957.000	122	914.400	959.400
99	909.800	954.800	111	912.200	957.200	123	914.600	959.600
100	910.000	955.000	112	912.400	957.400	124	914.800	959.800
101	910.200	955.200	113	912.600	957.600			
102	910.400	955.400	114	912.800	957.800			

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
975	880.200	925.200	992	883.600	928.600	1009	887.000	932.000
976	880.400	925.400	993	883.800	928.800	1010	887.200	932.200
977	880.600	925.600	994	884.000	929.000	1011	887.400	932.400
978	880.800	925.800	995	884.200	929.200	1012	887.600	932.600
979	881.000	926.000	996	884.400	929.400	1013	887.800	932.800
980	881.200	926.200	997	884.600	929.600	1014	888.000	933.000
981	881.400	926.400	998	884.800	929.800	1015	888.200	933.200
982	881.600	926.600	999	885.000	930.000	1016	888.400	933.400
983	881.800	926.800	1000	885.200	930.200	1017	888.600	933.600
984	882.000	927.000	1001	885.400	930.400	1018	888.800	933.800
985	882.200	927.200	1002	885.600	930.600	1019	889.000	934.000
986	882.400	927.400	1003	885.800	930.800	1020	889.200	934.200
987	882.600	927.600	1004	886.000	931.000	1021	889.400	934.400
988	882.800	927.800	1005	886.200	931.200	1022	889.600	934.600
989	883.000	928.000	1006	886.400	931.400	1023	889.800	934.800
990	883.200	928.200	1007	886.600	931.600			
991	883.400	928.400	1008	886.800	931.800			



F-3. GSM-1900 ARFCN Frequencies (in MHz)

This subsection includes the following GSM-1900 ARFCN tables:

GSM-1900 A-Band ARFCN - Frequency (in MHz) Table F-1

GSM-1900 B-Band ARFCN - Frequency (in MHz) Table F-2

GSM-1900 C-Band ARFCN - Frequency (in MHz) Table F-3

GSM-1900 D-Band ARFCN - Frequency (in MHz) Table F-4

GSM-1900 E-Band ARFCN - Frequency (in MHz) Table F-5

GSM-1900 F-Band ARFCN - Frequency (in MHz) Table F-6

GSM-1900 A-Band ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
512	1850.2000	1930.2000	537	1855.2000	1935.2000	562	1860.2000	1940.2000
513	1850.4000	1930.4000	538	1855.4000	1935.4000	563	1860.4000	1940.4000
514	1850.6000	1930.6000	539	1855.6000	1935.6000	564	1860.6000	1940.6000
515	1850.8000	1930.8000	540	1855.8000	1935.8000	565	1860.8000	1940.8000
516	1851.0000	1931.0000	541	1856.0000	1936.0000	566	1861.0000	1941.0000
517	1851.2000	1931.2000	542	1856.2000	1936.2000	567	1861.2000	1941.2000
518	1851.4000	1931.4000	543	1856.4000	1936.4000	568	1861.4000	1941.4000
519	1851.6000	1931.6000	544	1856.6000	1936.6000	569	1861.6000	1941.6000
520	1851.8000	1931.8000	545	1856.8000	1936.8000	570	1861.8000	1941.8000
521	1852.0000	1932.0000	546	1857.0000	1937.0000	571	1862.0000	1942.0000
522	1852.2000	1932.2000	547	1857.2000	1937.2000	572	1862.2000	1942.2000
523	1852.4000	1932.4000	548	1857.4000	1937.4000	573	1862.4000	1942.4000
524	1852.6000	1932.6000	549	1857.6000	1937.6000	574	1862.6000	1942.6000
525	1852.8000	1932.8000	550	1857.8000	1937.8000	575	1862.8000	1942.8000
526	1853.0000	1933.0000	551	1858.0000	1938.0000	576	1863.0000	1943.0000
527	1853.2000	1933.2000	552	1858.2000	1938.2000	577	1863.2000	1943.2000
528	1853.4000	1933.4000	553	1858.4000	1938.4000	578	1863.4000	1943.4000
529	1853.6000	1933.6000	554	1858.6000	1938.6000	579	1863.6000	1943.6000
530	1853.8000	1933.8000	555	1858.8000	1938.8000	580	1863.8000	1943.8000
531	1854.0000	1934.0000	556	1859.0000	1939.0000	581	1864.0000	1944.0000
532	1854.2000	1934.2000	557	1859.2000	1939.2000	582	1864.2000	1944.2000
533	1854.4000	1934.4000	558	1859.4000	1939.4000	583	1864.4000	1944.4000
534	1854.6000	1934.6000	559	1859.6000	1939.6000	584	1864.6000	1944.6000
535	1854.8000	1934.8000	560	1859.8000	1939.8000	585	1864.8000	1944.8000
536	1855.0000	1935.0000	561	1860.0000	1940.0000	586	1865.0000	1945.0000



GSM-1900 D-Band ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
587	1865.2000	1945.2000	596	1867.0000	1947.0000	605	1868.8000	1948.8000
588	1865.4000	1945.4000	597	1867.2000	1947.2000	606	1869.0000	1949.0000
589	1865.6000	1945.6000	598	1867.4000	1947.4000	607	1869.2000	1949.2000
590	1865.8000	1945.8000	599	1867.6000	1947.6000	608	1869.4000	1949.4000
591	1866.0000	1946.0000	600	1867.8000	1947.8000	609	1869.6000	1949.6000
592	1866.2000	1946.2000	601	1868.0000	1948.0000	610	1869.8000	1949.8000
593	1866.4000	1946.4000	602	1868.2000	1948.2000	611	1870.0000	1950.0000
594	1866.6000	1946.6000	603	1868.4000	1948.4000			
595	1866.8000	1946.8000	604	1868.6000	1948.6000			

GSM-1900 B-Band ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
612	1870.2000	1950.2000	637	1875.2000	1955.2000	662	1880.2000	1960.2000
613	1870.4000	1950.4000	638	1875.4000	1955.4000	663	1880.4000	1960.4000
614	1870.6000	1950.6000	639	1875.6000	1955.6000	664	1880.6000	1960.6000
615	1870.8000	1950.8000	640	1875.8000	1955.8000	665	1880.8000	1960.8000
616	1871.0000	1951.0000	641	1876.0000	1956.0000	666	1881.0000	1961.0000
617	1871.2000	1951.2000	642	1876.2000	1956.2000	667	1881.2000	1961.2000
618	1871.4000	1951.4000	643	1876.4000	1956.4000	668	1881.4000	1961.4000
619	1871.6000	1951.6000	644	1876.6000	1956.6000	669	1881.6000	1961.6000
620	1871.8000	1951.8000	645	1876.8000	1956.8000	670	1881.8000	1961.8000
621	1872.0000	1952.0000	646	1877.0000	1957.0000	671	1882.0000	1962.0000
622	1872.2000	1952.2000	647	1877.2000	1957.2000	672	1882.2000	1962.2000
623	1872.4000	1952.4000	648	1877.4000	1957.4000	673	1882.4000	1962.4000
624	1872.6000	1952.6000	649	1877.6000	1957.6000	674	1882.6000	1962.6000
625	1872.8000	1952.8000	650	1877.8000	1957.8000	675	1882.8000	1962.8000
626	1873.0000	1953.0000	651	1878.0000	1958.0000	676	1883.0000	1963.0000
627	1873.2000	1953.2000	652	1878.2000	1958.2000	677	1883.2000	1963.2000
628	1873.4000	1953.4000	653	1878.4000	1958.4000	678	1883.4000	1963.4000
629	1873.6000	1953.6000	654	1878.6000	1958.6000	679	1883.6000	1963.6000
630	1873.8000	1953.8000	655	1878.8000	1958.8000	680	1883.8000	1963.8000
631	1874.0000	1954.0000	656	1879.0000	1959.0000	681	1884.0000	1964.0000
632	1874.2000	1954.2000	657	1879.2000	1959.2000	682	1884.2000	1964.2000
633	1874.4000	1954.4000	658	1879.4000	1959.4000	683	1884.4000	1964.4000
634	1874.6000	1954.6000	659	1879.6000	1959.6000	684	1884.6000	1964.6000
635	1874.8000	1954.8000	660	1879.8000	1959.8000	685	1884.8000	1964.8000
636	1875.0000	1955.0000	661	1880.0000	1960.0000	686	1885.0000	1965.0000



GSM-1900 E-Band ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
687	1885.2000	1965.2000	696	1887.0000	1967.0000	705	1888.8000	1968.8000
688	1885.4000	1965.4000	697	1887.2000	1967.2000	706	1889.0000	1969.0000
689	1885.6000	1965.6000	698	1887.4000	1967.4000	707	1889.2000	1969.2000
690	1885.8000	1965.8000	699	1887.6000	1967.6000	708	1889.4000	1969.4000
691	1886.0000	1966.0000	700	1887.8000	1967.8000	709	1889.6000	1969.6000
692	1886.2000	1966.2000	701	1888.0000	1968.0000	710	1889.8000	1969.8000
693	1886.4000	1966.4000	702	1888.2000	1968.2000	711	1890.0000	1970.0000
694	1886.6000	1966.6000	703	1888.4000	1968.4000			
695	1886.8000	1966.8000	704	1888.6000	1968.6000			

GSM-1900 F-Band ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
712	1890.2000	1970.2000	721	1892.0000	1972.0000	730	1893.8000	1973.8000
713	1890.4000	1970.4000	722	1892.2000	1972.2000	731	1894.0000	1974.0000
714	1890.6000	1970.6000	723	1892.4000	1972.4000	732	1894.2000	1974.2000
715	1890.8000	1970.8000	724	1892.6000	1972.6000	733	1894.4000	1974.4000
716	1891.0000	1971.0000	725	1892.8000	1972.8000	734	1894.6000	1974.6000
717	1891.2000	1971.2000	726	1893.0000	1973.0000	735	1894.8000	1974.8000
718	1891.4000	1971.4000	727	1893.2000	1973.2000	736	1895.0000	1975.0000
719	1891.6000	1971.6000	728	1893.4000	1973.4000			
720	1891.8000	1971.8000	729	1893.6000	1973.6000			

GSM-1900 C-Band ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
737	1895.2000	1975.2000	762	1900.2000	1980.2000	787	1905.2000	1985.2000
738	1895.4000	1975.4000	763	1900.4000	1980.4000	788	1905.4000	1985.4000
739	1895.6000	1975.6000	764	1900.6000	1980.6000	789	1905.6000	1985.6000
740	1895.8000	1975.8000	765	1900.8000	1980.8000	790	1905.8000	1985.8000
741	1896.0000	1976.0000	766	1901.0000	1981.0000	791	1906.0000	1986.0000
742	1896.2000	1976.2000	767	1901.2000	1981.2000	792	1906.2000	1986.2000
743	1896.4000	1976.4000	768	1901.4000	1981.4000	793	1906.4000	1986.4000
744	1896.6000	1976.6000	769	1901.6000	1981.6000	794	1906.6000	1986.6000
745	1896.8000	1976.8000	770	1901.8000	1981.8000	795	1906.8000	1986.8000
746	1897.0000	1977.0000	771	1902.0000	1982.0000	796	1907.0000	1987.0000
747	1897.2000	1977.2000	772	1902.2000	1982.2000	797	1907.2000	1987.2000
748	1897.4000	1977.4000	773	1902.4000	1982.4000	798	1907.4000	1987.4000
749	1897.6000	1977.6000	774	1902.6000	1982.6000	799	1907.6000	1987.6000
750	1897.8000	1977.8000	775	1902.8000	1982.8000	800	1907.8000	1987.8000
751	1898.0000	1978.0000	776	1903.0000	1983.0000	801	1908.0000	1988.0000
752	1898.2000	1978.2000	777	1903.2000	1983.2000	802	1908.2000	1988.2000
753	1898.4000	1978.4000	778	1903.4000	1983.4000	803	1908.4000	1988.4000



ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
754	1898.6000	1978.6000	779	1903.6000	1983.6000	804	1908.6000	1988.6000
755	1898.8000	1978.8000	780	1903.8000	1983.8000	805	1908.8000	1988.8000
756	1899.0000	1979.0000	781	1904.0000	1984.0000	806	1909.0000	1989.0000
757	1899.2000	1979.2000	782	1904.2000	1984.2000	807	1909.2000	1989.2000
758	1899.4000	1979.4000	783	1904.4000	1984.4000	808	1909.4000	1989.4000
759	1899.6000	1979.6000	784	1904.6000	1984.6000	809	1909.6000	1989.6000
760	1899.8000	1979.8000	785	1904.8000	1984.8000	810	1909.8000	1989.8000
761	1900.0000	1980.0000	786	1905.0000	1985.0000			



F-4. GSM-1800 ARFCN Frequencies (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
512	1710.200	1805.200	552	1718.200	1813.200	592	1726.200	1821.200
513	1710.400	1805.400	553	1718.400	1813.400	593	1726.400	1821.400
514	1710.600	1805.600	554	1718.600	1813.600	594	1726.600	1821.600
515	1710.800	1805.800	555	1718.800	1813.800	595	1726.800	1821.800
516	1711.000	1806.000	556	1719.000	1814.000	596	1727.000	1822.000
517	1711.200	1806.200	557	1719.200	1814.200	597	1727.200	1822.200
518	1711.400	1806.400	558	1719.400	1814.400	598	1727.400	1822.400
519	1711.600	1806.600	559	1719.600	1814.600	599	1727.600	1822.600
520	1711.800	1806.800	560	1719.800	1814.800	600	1727.800	1822.800
521	1712.000	1807.000	561	1720.000	1815.000	601	1728.000	1823.000
522	1712.200	1807.200	562	1720.200	1815.200	602	1728.200	1823.200
523	1712.400	1807.400	563	1720.400	1815.400	603	1728.400	1823.400
524	1712.600	1807.600	564	1720.600	1815.600	604	1728.600	1823.600
525	1712.800	1807.800	565	1720.800	1815.800	605	1728.800	1823.800
526	1713.000	1808.000	566	1721.000	1816.000	606	1729.000	1824.000
527	1713.200	1808.200	567	1721.200	1816.200	607	1729.200	1824.200
528	1713.400	1808.400	568	1721.400	1816.400	608	1729.400	1824.400
529	1713.600	1808.600	569	1721.600	1816.600	609	1729.600	1824.600
530	1713.800	1808.800	570	1721.800	1816.800	610	1729.800	1824.800
531	1714.000	1809.000	571	1722.000	1817.000	611	1730.000	1825.000
532	1714.200	1809.200	572	1722.200	1817.200	612	1730.200	1825.200
533	1714.400	1809.400	573	1722.400	1817.400	613	1730.400	1825.400
534	1714.600	1809.600	574	1722.600	1817.600	614	1730.600	1825.600
535	1714.800	1809.800	575	1722.800	1817.800	615	1730.800	1825.800
536	1715.000	1810.000	576	1723.000	1818.000	616	1731.000	1826.000
537	1715.200	1810.200	577	1723.200	1818.200	617	1731.200	1826.200
538	1715.400	1810.400	578	1723.400	1818.400	618	1731.400	1826.400
539	1715.600	1810.600	579	1723.600	1818.600	619	1731.600	1826.600
540	1715.800	1810.800	580	1723.800	1818.800	620	1731.800	1826.800
541	1716.000	1811.000	581	1724.000	1819.000	621	1732.000	1827.000
542	1716.200	1811.200	582	1724.200	1819.200	622	1732.200	1827.200
543	1716.400	1811.400	583	1724.400	1819.400	623	1732.400	1827.400
544	1716.600	1811.600	584	1724.600	1819.600	624	1732.600	1827.600
545	1716.800	1811.800	585	1724.800	1819.800	625	1732.800	1827.800
546	1717.000	1812.000	586	1725.000	1820.000	626	1733.000	1828.000
547	1717.200	1812.200	587	1725.200	1820.200	627	1733.200	1828.200
548	1717.400	1812.400	588	1725.400	1820.400	628	1733.400	1828.400
549	1717.600	1812.600	589	1725.600	1820.600	629	1733.600	1828.600
550	1717.800	1812.800	590	1725.800	1820.800	630	1733.800	1828.800
551	1718.000	1813.000	591	1726.000	1821.000	631	1734.000	1829.000



ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
632	1734.200	1829.200	675	1742.800	1837.800	718	1751.400	1846.400
633	1734.400	1829.400	676	1743.000	1838.000	719	1751.600	1846.600
634	1734.600	1829.600	677	1743.200	1838.200	720	1751.800	1846.800
635	1734.800	1829.800	678	1743.400	1838.400	721	1752.000	1847.000
636	1735.000	1830.000	679	1743.600	1838.600	722	1752.200	1847.200
637	1735.200	1830.200	680	1743.800	1838.800	723	1752.400	1847.400
638	1735.400	1830.400	681	1744.000	1839.000	724	1752.600	1847.600
639	1735.600	1830.600	682	1744.200	1839.200	725	1752.800	1847.800
640	1735.800	1830.800	683	1744.400	1839.400	726	1753.000	1848.000
641	1736.000	1831.000	684	1744.600	1839.600	727	1753.200	1848.200
642	1736.200	1831.200	685	1744.800	1839.800	728	1753.400	1848.400
643	1736.400	1831.400	686	1745.000	1840.000	729	1753.600	1848.600
644	1736.600	1831.600	687	1745.200	1840.200	730	1753.800	1848.800
645	1736.800	1831.800	688	1745.400	1840.400	731	1754.000	1849.000
646	1737.000	1832.000	689	1745.600	1840.600	732	1754.200	1849.200
647	1737.200	1832.200	690	1745.800	1840.800	733	1754.400	1849.400
648	1737.400	1832.400	691	1746.000	1841.000	734	1754.600	1849.600
649	1737.600	1832.600	692	1746.200	1841.200	735	1754.800	1849.800
650	1737.800	1832.800	693	1746.400	1841.400	736	1755.000	1850.000
651	1738.000	1833.000	694	1746.600	1841.600	737	1755.200	1850.200
652	1738.200	1833.200	695	1746.800	1841.800	738	1755.400	1850.400
653	1738.400	1833.400	696	1747.000	1842.000	739	1755.600	1850.600
654	1738.600	1833.600	697	1747.200	1842.200	740	1755.800	1850.800
655	1738.800	1833.800	698	1747.400	1842.400	741	1756.000	1851.000
656	1739.000	1834.000	699	1747.600	1842.600	742	1756.200	1851.200
657	1739.200	1834.200	700	1747.800	1842.800	743	1756.400	1851.400
658	1739.400	1834.400	701	1748.000	1843.000	744	1756.600	1851.600
659	1739.600	1834.600	702	1748.200	1843.200	745	1756.800	1851.800
660	1739.800	1834.800	703	1748.400	1843.400	746	1757.000	1852.000
661	1740.000	1835.000	704	1748.600	1843.600	747	1757.200	1852.200
662	1740.200	1835.200	705	1748.800	1843.800	748	1757.400	1852.400
663	1740.400	1835.400	706	1749.000	1844.000	749	1757.600	1852.600
664	1740.600	1835.600	707	1749.200	1844.200	750	1757.800	1852.800
665	1740.800	1835.800	708	1749.400	1844.400	751	1758.000	1853.000
666	1741.000	1836.000	709	1749.600	1844.600	752	1758.200	1853.200
667	1741.200	1836.200	710	1749.800	1844.800	753	1758.400	1853.400
668	1741.400	1836.400	711	1750.000	1845.000	754	1758.600	1853.600
669	1741.600	1836.600	712	1750.200	1845.200	755	1758.800	1853.800
670	1741.800	1836.800	713	1750.400	1845.400	756	1759.000	1854.000
671	1742.000	1837.000	714	1750.600	1845.600	757	1759.200	1854.200
672	1742.200	1837.200	715	1750.800	1845.800	758	1759.400	1854.400
673	1742.400	1837.400	716	1751.000	1846.000	759	1759.600	1854.600
674	1742.600	1837.600	717	1751.200	1846.200	760	1759.800	1854.800
ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK



761	1760.000	1855.000	802	1768.200	1863.200	844	1776.600	1871.600
762	1760.200	1855.200	803	1768.400	1863.400	845	1776.800	1871.800
763	1760.400	1855.400	804	1768.600	1863.600	846	1777.000	1872.000
764	1760.600	1855.600	805	1768.800	1863.800	847	1777.200	1872.200
765	1760.800	1855.800	806	1769.000	1864.000	848	1777.400	1872.400
766	1761.000	1856.000	807	1769.200	1864.200	849	1777.600	1872.600
767	1761.200	1856.200	808	1769.400	1864.400	850	1777.800	1872.800
768	1761.400	1856.400	809	1769.600	1864.600	851	1778.000	1873.000
769	1761.600	1856.600	810	1769.800	1864.800	852	1778.200	1873.200
770	1761.800	1856.800	811	1770.000	1865.000	853	1778.400	1873.400
771	1762.000	1857.000	812	1770.200	1865.200	854	1778.600	1873.600
772	1762.200	1857.200	813	1770.400	1865.400	855	1778.800	1873.800
773	1762.400	1857.400	814	1770.600	1865.600	856	1779.000	1874.000
774	1762.600	1857.600	815	1770.800	1865.800	857	1779.200	1874.200
775	1762.800	1857.800	816	1771.000	1866.000	858	1779.400	1874.400
776	1763.000	1858.000	817	1771.200	1866.200	859	1779.600	1874.600
777	1763.200	1858.200	818	1771.400	1866.400	860	1779.800	1874.800
778	1763.400	1858.400	819	1771.600	1866.600	861	1780.000	1875.000
779	1763.600	1858.600	820	1771.800	1866.800	862	1780.200	1875.200
780	1763.800	1858.800	821	1772.000	1867.000	863	1780.400	1875.400
781	1764.000	1859.000	822	1772.200	1867.200	864	1780.600	1875.600
782	1764.200	1859.200	823	1772.400	1867.400	865	1780.800	1875.800
783	1764.400	1859.400	824	1772.600	1867.600	866	1781.000	1876.000
784	1764.600	1859.600	825	1772.800	1867.800	867	1781.200	1876.200
785	1764.800	1859.800	826	1773.000	1868.000	868	1781.400	1876.400
786	1765.000	1860.000	827	1773.200	1868.200	869	1781.600	1876.600
787	1765.200	1860.200	828	1773.400	1868.400	870	1781.800	1876.800
788	1765.400	1860.400	829	1773.600	1868.600	871	1782.000	1877.000
789	1765.600	1860.600	830	1773.800	1868.800	872	1782.200	1877.200
790	1765.800	1860.800	831	1774.000	1869.000	873	1782.400	1877.400
791	1766.000	1861.000	832	1774.200	1869.200	874	1782.600	1877.600
792	1766.200	1861.200	833	1774.400	1869.400	875	1782.800	1877.800
793	1766.400	1861.400	834	1774.600	1869.600	876	1783.000	1878.000
794	1766.600	1861.600	835	1774.800	1869.800	877	1783.200	1878.200
795	1766.800	1861.800	836	1775.000	1870.000	878	1783.400	1878.400
796	1767.000	1862.000	837	1775.200	1870.200	879	1783.600	1878.600
797	1767.200	1862.200	838	1775.400	1870.400	880	1783.800	1878.800
798	1767.400	1862.400	839	1775.600	1871.600	881	1784.000	1879.000
799	1767.600	1862.600	840	1775.800	1871.800	882	1784.200	1879.200
800	1767.800	1862.800	841	1776.000	1871.000	883	1784.400	1879.400
801	1768.000	1863.000	842	1776.200	1871.200	884	1784.600	1879.600
			843	1776.400	1871.400	885	1784.800	1879.800

