

# Ericsson W3x Series

Mobile Broadband Router for WCDMA/HSPA Mobile Networks

## Technical Product Description

Software Release R12



  
Mobile  
Broadband

**ERICSSON** 

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Software Release R12

### **Abstract**

This document describes the Ericsson's Mobile Broadband Router (MBR), the W3x product series.

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# 1 Ericsson W3x Series Overview

## 1.1 Introduction

The Ericsson Mobile Broadband Router (MBR) W3x product series is the superior solution for providing broadband services to areas with no fixed broadband infrastructure in a cost efficient way utilizing existing 3G powered mobile networks. It replaces the Fixed Wireless Terminal (FWT) W2x product series.

The W3x product series facilitates protected, high-speed Internet access for multiple users in home and small or branch office environments. It includes advanced data capabilities such as router and switch functionality, and provides the users with multiple possibilities for local area connectivity (Ethernet and WLAN).

The W3x product series consist of two models:

- **Ericsson W30** – Data Router
- **Ericsson W35** – Data and Voice Router (variants available, see section 1.3).

With WCDMA/HSPA WAN radio access capability the W3x products are well suited to provide broadband data access with data speeds similar to that of fixed line DSL services. The data rate is up to 7.2 Mbps and the up-link speed is up to 2Mbps.

## 1.2 Ericsson W30 - Data Router

The Ericsson W30 data router provides data capabilities such as data access (e.g. Internet) in the respect that it allows multiple computers to be connected to the router using Ethernet or wireless LAN (WLAN). It also supports file and printer sharing via the USB port.

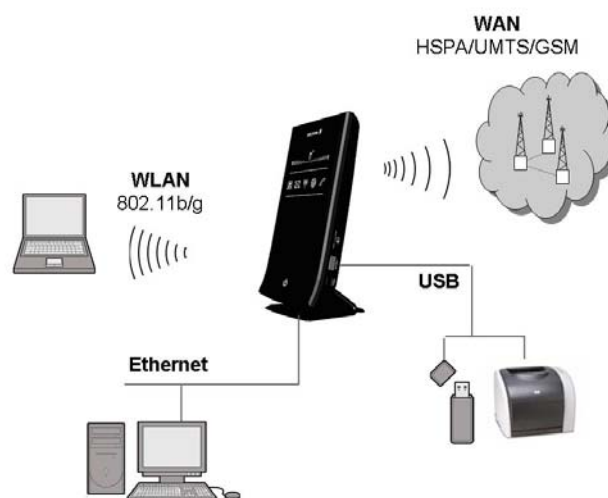


Figure 1 - Overview of Interfaces for the Ericsson W30

## 1.3

### Ericsson W35 – Data and Voice Router

The Ericsson W35 data and voice router incorporates the same set of functions and data features as the Ericsson W30. Additionally, this model also includes high quality voice and fax services via the telephony interfaces. A broad range of network related services such as Prepaid Subscription, CLI (Calling Line Identification), Call Waiting, Call Forwarding, and Multiparty Conference Calls are available.

WCDMA/HSPA radio access is well suited for combined and efficient data and voice transmission over the mobile network.



Figure 2 - Overview of Interfaces for the Ericsson W35

The Ericsson W35 is available in two variants each supporting different combinations of UMTS frequency bands;

- 850/1900/2100 MHz
- 900/1900/2100 MHz

## 1.4

### Ericsson W3x Feature Summary

The Ericsson W3x features the latest technology, which makes them highly suitable for everyday broadband services. The main features are:

- **Multimode broadband WAN connectivity;**  
Support antenna diversity and have WCDMA/HSPA (850/900/1900/2100 MHz) as primary access and GSM/GPRS/EDGE (850/900/1800/1900 MHz) as fall-back. The data rate is up to 7.2 Mbps in the downlink direction and up to 2.0 Mbps in the uplink direction.



- **Four ports Fast Ethernet switch;**  
for wired LAN connectivity with rate auto-negotiation and MDI/MDIX auto-detection support.
- **One USB 2.0 port;**  
for file and printer sharing.
- **Wireless LAN Access Point;**  
An integrated WLAN 802.11b/g access point for wireless LAN connectivity.  
Wireless security features including standard WLAN WEP, WPA, WPA2, encryptions and MAC Association Control.
- **Flexible networking capabilities;**  
Comprehensive set of networking and IP protocols such as bridging, routing, DNS, DynDNS, DHCP server/relay, SNTP, and NAT.  
L2TP tunneling providing a mechanism for tunneling Ethernet frames between two peers over an existing network.  
VPN pass-through supporting VPN protocols for standard IPsec VPN applications.  
IPsec/VPN termination supporting one IPsec/VPN tunnel using Site-to-Site configuration (Tunnel mode).  
Stateful packet filtering firewall.  
QoS feature for outgoing IP traffic via the WAN interface.
- **Voice and fax services (W35 only);**  
High quality voice and fax services via the telephony interface.  
Fax service using SIP and the T.38 protocol.
- **Administration and Management;**  
Local and remote administration and management with SSH2 support.
- **End-user Configuration**  
Built-in web based configuration tool with wizard support for configuring wireless LAN.
- **TR-069**  
An integrated remote management agent supporting the CPE WAN Management Protocol (CWMP) as specified in DSL Forum TR-069 Amendment II. Supports remote software image installation, shell script execution and a set of configuration and status parameters.
- **TEMS™ Investigation**  
Support for TEMS Investigation providing possibilities for the operator to perform real-time diagnostics check and log radio interface behaviors.

## 2 Hardware Overview

This chapter describes the hardware of the Ericsson W3x in terms of housing, interfaces, LED indicators, power supply, and antennas.

### 2.1 Housing

The housing of the Ericsson W3x is designed to be either wall mounted or standing on the desk by use of the provided table stand.

The unit (not mounted in the table stand) weighs approximately 380 gr and measures 185 mm (H) x 106 mm (W) x 45 mm (D).

### 2.2 Main Board

The main board provides all functionality apart from the radio parts (i.e. UMTS/HSPA module and WLAN module).

The supported UMTS/HSPA modules are Sierra Wireless MC 8790 and MC 8792 for Ericsson W35 and Ericsson F3507g for Ericsson W30.

The supported WLAN module is based on Broadcom BCM 4318E.

#### 2.2.1 Back Side Interfaces

The back side of the Ericsson W3x includes the following interfaces:



Figure 3 - W35 back side

The interfaces are described in the tables below:

Interface	Type	Function
Ethernet 1-4	4 x RJ45	Ethernet LAN connectors for connecting client PCs to the unit.
10-28VDC	4 pins	Power inlet for connecting the provided power supply adapter or an optional battery pack (W35 only).
Reset button	Switch	A small hole in the housing. Used to reset the unit to its factory default configuration.

In addition to the above, the Ericsson W35 also includes the following interfaces for telephony and fax services:

Interface	Type	Function
Phone/ Fax	RJ11	Phone/Fax connector for connecting a fax machine to the unit.
Phone	RJ11	Phone/Fax connector for connecting a standard analog phone to the unit.

Telephony and fax services must be supported by the subscription/network in order to work.

## 2.2.2

### Left Side Interfaces

The left side of the Ericsson W3x is equipped with the following interfaces:



Figure 4 - W3x left side

The table below describes the interfaces:

Interface	Type	Function
SIM	SIM card slot	SIM card slot for inserting a SIM card.
USB	USB-A	USB connector, for connecting USB device(s) to the unit, e.g. printer or mass storage.
Button		For future use.

### 2.2.3

#### Right Side Interface

The right side of the Ericsson W3x is equipped with an antenna connector (type MCX) for connecting an optional external antenna for the WAN interface. See section 2.3.2 for further information.



Figure 5 – W3x right side

## 2.2.4

### LED Indicators

The front panel of the Ericsson W3x includes a signal quality indicator, LED indicators and a Standby button as described below.



Figure 6 - W30 (to the left) and W35 LED Indicators

#### 2.2.4.1

##### Signal Quality Indicator

The signal quality indicator shows the quality of the signal from the mobile network. The more segments displayed in the bar graph, the stronger the signal.



The symbol in the centre of the graph is blinking when searching for a mobile network connection and when a connection is established, it indicates the following:

When **3G** is displayed there is a connection to a UMTS network.



**3G** with a **+** sign indicates connection to a HSPA network.


When the 3G symbol is **off** and the segment bar displays signal, there is a connection to a GSM/GPRS/EDGE network.

#### 2.2.4.2

##### W30 LED Indicators

The following LED indicators are visible on the front of the Ericsson W30:






Symbol	Color	Function
 WUI	Blinking (blue) Unlit	Various alarm conditions specified in the WUI. No alarms.
 Wireless LAN	Blue Unlit	The Wireless LAN is activated. The Wireless LAN is not activated.

 Internet	Blue Unlit	Connection to Internet established. No Internet connection.
---	---------------	--

### 2.2.4.3


#### W35 LED Indicators

The following LED indicators are visible on the front of the Ericsson W35:

Symbol	Color	Function
 Message	Blinking (blue) Unlit	New voice mail message(s) is available. No voice message(s) available.
 WUI	Blinking (blue) Unlit	Various alarm conditions exist specified in the WUI. No alarms.
 Wireless LAN	Blue Unlit	The Wireless LAN is activated. The Wireless LAN is not activated.
 Internet	Blue Unlit	A connection to Internet is established. No Internet connection.
	Blue Unlit	A connected telephone is off-hook. A connected telephone is on-hook.

### 2.2.4.4

#### Standby Button

The Standby  button at the bottom of the front has the following function:

- The button shows blue when the unit is powered on.
- The button shows red when the unit is in standby mode. This happens when running on battery power (W35 only) or when the button has been pressed.

### 2.2.5

#### SIM/USIM Interface

The Ericsson W3x has a plug-in SIM/USIM card connection supporting 1.8, 3 and 5V SIM.

### 2.2.6

#### Mounting

The Ericsson W3x can be wall mounted using the key holes on the back of the unit.

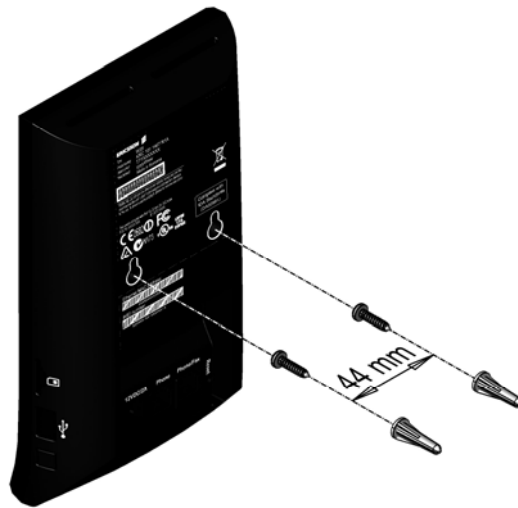


Figure 7 - W3x wall mounted

The Ericsson W3x can also be placed on flat surface using the provided table stand:



Figure 8 - W3x in table stand

## 2.3 Antennas

The Ericsson W3x is equipped with internal/external antennas as described in the following subsections.

### 2.3.1 Internal UMTS/GSM Antennas

The Ericsson W3x supports antenna diversity and has two internal UMTS/GSM antennas of standard dipole type (omni-directional in the horizontal plane) with a gain of 2 dBi.

The antennas are penta-band supporting the 850/900/1800/1900/2100 MHz frequency bands.

Refer to chapter 11 – *Antenna Characteristics* for information about radiation patterns.

## **2.3.2 External UMTS/GSM Antennas**

The Ericsson W3x is equipped with an MCX antenna connector for connecting an optional external antenna available as an accessory and as described below.

### **2.3.2.1 Window Antenna**

An UMTS/GSM window antenna is available as an accessory.

This antenna is a penta-band antenna operating in the 824-960 and 1710-2170 MHz frequency bands with a gain of 2.15 dBi.

The main function of the window antenna is to be able to separate the placement of the unit and the antenna. Note that some modern windows with metal coated energy glass will degrade the performance.

### **2.3.2.2 Roof Antenna**

An UMTS/GSM roof antenna is available as an accessory.

This antenna is a penta-band antenna operating in the 824-960 and 1710-2170 MHz frequency bands with a gain of 11 dBi with 0.5 dBi variation over specified bands.

The roof antenna has a narrow directional angle for optimal performance and it is very important to have it correct installed and aligned. Note that line of sight with the base station is desired. If this is not possible, there is not always best to point the antenna in the direction towards the base station. It might be the case that a reflection from an obstacle can give better performance.

## **2.3.3 Internal WLAN Antennas**

The Ericsson W3x has two internal WLAN antennas (omni-directional).

The antennas are mounted orthogonally for best performance.

## **2.4 Power Supply**

The Ericsson W3x can be powered from:

- AC Mains via an external AC/DC power adapter (10-28 VDC)
- Battery pack (backup). Only for W35, see section 2.4.2.

### **2.4.1 Power Adapter**

The provided power adapter has the following characteristics:

Input: 100-240V AC, 50-60 Hz, 3 pin AC inlet connector (IEC 320 power inlet).

Output: 15 VDC.

Power consumption: 7.0 W (typical) and 11.4 W (maximum) for W30 and 9.0 W (typical) and 12 W (maximum) for W35.



National power cables are available for EU, UK, US and AU.



**Figure 9** - Power adapter with national cords

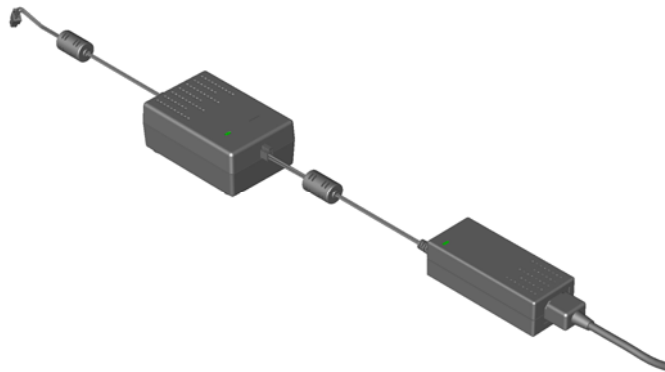
## 2.4.2 Battery Backup (W35 only)

The Ericsson W35 can be powered with a rechargeable battery pack to provide voice redundancy in the event of a total mains power failure. A battery charger that recharges the battery is located in the battery pack.

If a power failure occurs the Ericsson W35 automatically switches over to battery operation. In order to extend the battery time only voice services are available. Data services, such as USB, Ethernet and Wireless LAN functions will be unavailable.

The stand by time is up to 4 hours if no telephone calls are made and talk time is typically 3 hours. Battery time depends on the mobile network signal quality, battery age, and environmental temperature.

The battery pack is available as an accessory and is inserted between the AC/DC adaptor and the Ericsson W35.



**Figure 10** - Battery pack

## 3 Interfaces Overview

This chapter provides an overview of the interfaces on the Ericsson W3x.

### 3.1 UMTS/GSM Radio Interfaces

The Ericsson W3x supports UMTS and GSM/GPRS/EDGE radio interfaces where UMTS is the primary interface.

#### 3.1.1 UMTS

The Ericsson W3x supports UMTS 850/900/1900/2100 MHz frequency bands.

Product variants is available supporting different frequency band combinations (850/1900/2100 MHz and 900/1900/2100 MHz).

The UMTS interface supports the following characteristics:

- WCDMA
- HSPA, Category 1-8 and 11/12, up to 7.2 Mbps (downlink) and Category 3 and 5, up to 2.0 Mbps (uplink)

#### 3.1.2 GSM/GPRS/EDGE

The Ericsson W3x supports GSM/GPRS/EDGE 850/900/1800/1900 MHz frequency bands.

The GPRS/EDGE interface supports the following characteristics:

- GPRS, multi-slot class 12 CS 1-4
- EDGE, multi-slot class 12, MCS 1-9
- Dual Transfer Mode (DTM)

#### 3.1.3 HSPA Throughput Rates

The Ericsson W3x peak download speed is rated up to 7.2 Mbps and the peak up-link speed is 2.0 Mbps. Future releases will support uplink speed up to 5.6 Mbps.

However peak downlink speeds are only possible with normal usage in a cell and with optimal signal conditions. Typical download speeds experienced by the users with multiple concurrent voice and data users in the cell, ranges from 0.6 Mbps to 5.0 Mbps on average with current Ericsson W3x radio configuration according to simulations in urban and suburban environments.

### 3.1.4

### Data Transmission

The Ericsson W3x offers packet switched data transmission. The table below summarizes typical and theoretical data rates:

Packet data service		Theoretical max data rate	Typical data rate	Category/ Multislot class
HSPA	Upload	2.0 Mbps	300-800 kbps	Category 3, 5
	Download	7.2 Mbps	600-5000 kbps	Category 1-8, 11 and 12
WCDMA	Upload	384 kbps	Over 300 kbps	
	Download	384 kbps	Over 300 kbps	
EDGE	Upload	118 kbps	50-60 kbps	Multislot class 12 MCS 1-9
	Download	236 kbps	100-130 kbps (with bursts over 200 kbps)	
GPRS	Upload	43 kbps	20 kbps	Multislot class 12 CS 1-4
	Download	86 kbps	40 kbps	

### 3.1.5

## Frequency Bands

The Ericsson W3x supports frequency bands as shown in the table below:

Band	Frequencies (MHz)	Conducted Rx sensitivity (dBm)	Conducted Transmit Power (dBm)
Band I UMTS 2100	Tx: 1920-1980 Rx: 2110-2170	< -109	+23 ±1 (Class 3)
Band II UMTS 1900	Tx: 1850-1910 Rx: 1930-1990	< -109	+23 ±1 (Class 3)
Band V UMTS 850	Tx: 824-849 Rx: 869-894	< -110	+23 ±1 (Class 3)
Band VIII UMTS 900	Tx: 880-915 Rx: 925-960	< -109	+23 ±1 (Class 3)
GSM 850	Tx: 824-849 Rx: 869-894	< -106	+32 ±1 GMSK mode (Class 4)
EGSM 900	Tx: 880-915 Rx: 925-960	< -106	+27 ±1 8PSK mode (Class E2)
DCS 1800	Tx: 1710-1785 Rx: 1805-1880	< -106	+29 ±1 GMSK mode (Class 1)
PCS 1900	Tx: 1850-1910 Rx: 1930-1990	< -106	+26 ±1 8PSK mode (Class E2)

### 3.2

## Wireless LAN (WLAN) Interface

The Ericsson W3x may act as a wireless Access Point (AP) supporting IEEE 802.11b/g standards.

IEEE 802.11b/g operates in the unlicensed 2.4 GHz band and can theoretically achieve 54 Mb/s. In practice, throughput around 25 Mb/s is more realistic.

The WLAN interface can be configured to run in combined b/g mode (supporting 802.11b and g clients at the same time) or as b-only or g-only. The b-mode-legacy is also supported.

The transmit power is configurable and is limited to maximum 20 dBm.

For wireless security the Ericsson W3x supports WEP, WPA-PSK, WPA2-PSK and MAC Association Control.

### 3.2.1

#### Wireless Radio Channels

The table below shows the IEEE 802.11 channels and their corresponding center frequencies:

Channel Number	Channel Frequency	Geographic Indoor Usage
1	2412 MHz	US, CA, ETSI, SI, AS, NZ, SA, MA
2	2417 MHz	US, CA, ETSI, SI, AS, NZ, SA, MA, CL
3	2422 MHz	US, CA, ETSI, SI, AS, NZ, SA, MA, CL
4	2427 MHz	US, CA, ETSI, SI, AS, NZ, SA, MA, CL
5	2432 MHz	US, CA, ETSI, SI, AS, NZ, SA, MA, CL
6	2437 MHz	US, CA, ETSI, SI, AS, NZ, SA, MA, CL
7	2442 MHz	US, CA, ETSI, SI, AS, NZ, SA, MA, CL
8	2447 MHz	US, CA, ETSI, SI, AS, NZ, SA, MA, CL
9	2452 MHz	US, CA, ETSI, SI, AS, NZ, SA, MA, CL
10	2457 MHz	US, CA, ETSI, SI, AS, NZ, SA, MA, CL
11	2462 MHz	US, CA, ETSI, SI, AS, NZ, SA, MA
12	2467 MHz	ETSI, SI, AS, NZ, SA, MA
13	2472 MHz	ETSI, SI, AS, NZ, SA, MA

US (United States), CA (Canada), ETSI (ETSI Countries), SI (Singapore), AS (Australia), NZ (New Zealand), SA (South Africa), MA (Malaysia), CL (Chile).

Radio scanning makes the Ericsson W3x capable of sensing other access points of the allowed channel.

### 3.3

#### USB Interface

The Ericsson W3x includes one USB 2.0 Host Controller with one external type A connector supporting low, full, and high speed. The USB interface supports one high power device hence the maximum power consumption of a device is 500 mA.

Maximum practical cable length for USB is 5 m.

### 3.4

#### Ethernet Interface

The Ericsson W3x includes a Fast Ethernet switch with four (4) external LAN 10/100BaseTx ports (female RJ45) for connection to Ethernet devices. Each Ethernet port supports rate auto-negotiation and MDI/MDIX auto-detection. The MDI/MDIX auto detection allows the user to plug in either a straight or crossed Ethernet cable.

Maximum cable length for Ethernet is 100 m.

### 3.4.1

#### **Built-in LED indicators**

Each Ethernet connector has two built-in indicators.

The left indicator shows the speed of data traffic between the W3x router and the connected client. If the speed is 100 Mbps, the indicator is green. When the indicator is unlit, the speed is 10 Mbps.

The indicator to the right is yellow when a LAN connection is established and flashes to show data traffic activity.

### 3.5

#### **Telephony Interface (W35 only)**

The Ericsson W35 includes dual POTS interface (Fxs); the physical ports marked "Phone" and "Phone/Fax". The "Phone" port is the primary port to be used for making CS\*-phone calls. The "Phone/Fax" port is intended for PS\*-based telephony services. This support fax machines and complementary telephony services.

\* CS = Circuit switch, the traditional way of supporting telephony services.

\* PS = Packet switch, the data-com way of supporting various communication services, including telephony (also called VoIP).

The ports are intended for on premises phones and should typically be connected to devices within one building. Short loops (max 500Ω) are supported.

The maximum ringing load for each port is 3 REN (corresponding to three (3) old fashioned phones with mechanical bells or twenty (20) modern phones with electronic ringing).

Characteristic impedance, gain, current etc of the ports are controlled by software. DTMF dialing is supported. The ports have protection to prevent the unit to be damaged by ESD (Electro Static Discharge).

## 4 Mobile Network Features

### 4.1 Preferred Roaming List (PRL)

The PRL contains information regarding the allowed systems and frequency bands. The PRL structure and coding is defined in TIA/EIA IS-683.

The Ericsson W3x uses the configured PRL region during the system selection and acquisition process, initially and when roaming.

### 4.2 PDP Contexts

The Ericsson W3x supports configuration of two simultaneous primary PDP contexts for the WAN interface. It is also possible to configure one secondary PDP context for each primary PDP context.

Configured PDP contexts can be individually enabled/disabled and includes the following settings:

- APN
- PPP username and password
- PDP authentication type (CHAP or PAP)

The above parameters can be configured either manually or automatically based on the SIM card's MCC and MNC. The Ericsson W3x includes a pre-defined list with commonly used APNs, PPP username/password, and authentication type.

#### 4.2.1 QoS Profile

A QoS profile (interactive or streaming) can be set for each PDP context. For the "streaming" profile the maximum and guaranteed bit rate for both uplink and downlink can be configured.

### 4.3 Mobile Network

The Ericsson W3x connects to the UMTS (3G) network when it is available and, if enabled, uses the GSM/GPRS/EDGE (2G) network as fallback. It is possible to configure if fallback should be enabled or disabled.

#### 4.3.1 W35 Frequency Band Selection

The Ericsson W35 includes the possibility to individually enable/disable frequency bands used for the connection; 850, 900, 1900 and 2100 for the UMTS (3G) network and 850, 900, 1800 and 1900 for the GSM/GPRS/EDGE (2G) network.

Note that there are different product variants available supporting different frequency band combinations.

### 4.3.2

### W30 Frequency Band Selection

The Ericsson W30 automatically supports all supported frequency bands when a network (3G and/or 2G) is enabled.

### 4.3.3

### W35 InterRAT and Frequency Hopping

Handover between the UMTS (3G) and the GSM/GPRS/EDGE (2G) networks is automatically managed by the Ericsson W35 according to the table below:

GSM 850	<->	WCDMA 1900 handover – blind mode
GSM 1900	<->	WCDMA 1900 handover – blind mode
GSM 850	<->	WCDMA 850 handover – blind mode
GSM 1900	<->	WCDMA 850 handover – blind mode
EGSM 900	<->	WCDMA 2100 handover – blind mode
GSM 850	<->	WCDMA 850 handover – idle frame measurements
GSM 1800	<->	WCDMA 2100 handover – blind mode
GSM 850	<->	WCDMA 1900 handover – idle frame measurements
EGSM 900	<->	WCDMA 2100 handover – idle frame measurements
GSM 1900	->	WCDMA 1900 handover – idle frame measurements
GSM 1800	<->	WCDMA 2100 handover – idle frame measurements
GSM 1900	->	WCDMA 850 handover – idle frame measurements
EGSM 900	<->	WCDMA 2100 cell reselection
GSM 850	<->	WCDMA 850 cell reselection
GSM 1800	<->	WCDMA 2100 cell reselection
GSM 850	<->	WCDMA 1900 cell reselection
EGSM 900	<->	WCDMA 2100 CCO
GSM 1900	<->	WCDMA 1900 cell reselection
GSM 1800	<->	WCDMA 2100 CCO
GSM 1900	<->	WCDMA 850 cell reselection
EGSM 900 (w/BCCH/PBCCH)	->	WCDMA 2100 reselection in packet transfer
GSM 850	<->	WCDMA 850 CCO
GSM 1800 (w/BCCH/PBCCH)	->	WCDMA 2100 reselection in packet transfer
GSM 850	<->	WCDMA 1900 CCO
GSM 1900	<->	WCDMA 1900 CCO
GSM 1900	<->	WCDMA 850 CCO
EDGE	<->	WCDMA cell reselection in packet transfer
GSM 850 (w/BCCH/PBCCH)	->	WCDMA 850 reselection in packet transfer
Inter-RAT NACC 2G	<->	3G
GSM 850 (w/BCCH/PBCCH)	->	WCDMA 1900 reselection in packet transfer



GSM 1900 (w/BCCH/PBCCH)	->	WCDMA 1900 reselection in packet transfer
GSM 1900 (w/BCCH/PBCCH)	->	WCDMA 850 reselection in packet transfer
3G background PLMN search while in 2G		
3G background PLMN search while in 3G		
PS data continuity during OOS and RAT change		
PS data continuity with MPDP (primary and secondary contexts) and RAT change		

#### 4.3.4 **W30 InterRAT and Frequency Hopping**

Handover between the UMTS (3G) and the GSM/GPRS/EDGE (2G) networks is automatically managed by the Ericsson W30.

#### 4.4 **RSCP Alarm Threshold**

For RSCP (Receive Signal Code Power) an alarm threshold can be set and if the current RSCP level is below the threshold value, a critical event is sent to the syslog.

#### 4.5 **Set Time/Date from Mobile Network (W35 only)**

The system time and date in the Ericsson W35 can be configured to be set from the mobile network. When the celltime service is initially enabled it checks and updates the time every 2 minutes for the first 20 minutes. After that, the synchronization occurs every 15 minutes.

As an alternative, and used for the Ericsson W30, synchronization can be done with a remote NTP server (see section 5.2.7).

#### 4.6 **Security**

The basic security feature of the Ericsson W3x is the same as any GSM phone, using a PIN code that comes with the subscription SIM card. The PIN code is simply entered via the WUI or via phone handset (W35 only).

To simplify usage, the Ericsson W3x has an auto PIN feature that requires the PIN code only to be entered the first time the unit is used or upon changing the SIM card.

Additionally the Ericsson W3x provides security features that prevent unauthorized use of the SIM card and the unit, which can be customized if required.

##### 4.6.1 **PIN Lock**

This feature locks the SIM card to a unique unit by changing the PIN code to a new random value. As a result, the SIM card cannot be used in another device unless the PUK code is known.

## 4.6.2

### Operator Lock

This feature allows for the use of SIM cards in the Ericsson W3x that meet specific criteria. This would normally be configured to allow only a specific operator or group of operators SIM cards.

The Ericsson W3x can be locked to only accept SIM cards based on one or more of the following:

- Mobile Country Code (MCC)
- Mobile Network Code (MNC)

MCCs are defined in ITU E.212 (“Land Mobile Numbering Plan”) for use in identifying mobile stations in wireless telephone networks. A MCC is often used in combination with a Mobile Network Code (MNC) in order to uniquely identify a network operator.

Both the MCC and MNC are part of the International Mobile Subscriber Identity (IMSI) number, which uniquely identifies a particular subscriber, and is stored on the SIM card.

From the WUI it is possible to enter a secret “Unlock Operator Lock” code (which is a random code generated at production).

## **5 Data Features**

### **5.1 Layer 2 Functions**

#### **5.1.1 Bridging LAN and WLAN**

The Ericsson W3x supports bridging/switching traffic between the LAN and WLAN interfaces.

#### **5.1.2 WLAN Whitelist**

The Ericsson W3x supports WLAN whitelist, also known as “MAC Association Control” or “MAC Access List”. Up to 20 WLAN MAC addresses can be added to the list and the use of the whitelist is possible to enable/disable.

### **5.2 Internet Protocol Services**

The Internet Services in the Ericsson W3x is based on the Internet Protocol version 4 (IPv4).

#### **5.2.1 IP Forwarding**

The Ericsson W3x supports IP forwarding and employs ingress traffic filtering on both the LAN and the WAN interfaces.

#### **5.2.2 Static Routing**

The Ericsson W3x supports destination based static routing. Static routes can be added to the routing table to ensure packets are forwarded to their correct destination.

#### **5.2.3 DNS**

The Ericsson W3x includes a DNS proxy server which responds to DNS requests from the local LAN/WLAN. It contains a database of local host names and addresses supplied by client DHCP requests.

In addition it also caches requests to remote DNS servers.

#### **5.2.4 Dynamic DNS**

The Ericsson W3x supports dynamic DNS (A-records).

#### **5.2.5 DHCP Server**

The Ericsson W3x includes a DHCP server for LAN/WLAN interfaces.

The DHCP server maintains a pool of IP addresses and distributes them to LAN/WLAN clients whenever they are switched on. It also puts the hostname, supplied by the client DHCP request, in the local DNS proxy.

#### **5.2.6 DHCP Relay**

The Ericsson W3x supports DHCP relay. As a DHCP relay agent, the router forwards requests for IP addresses from LAN/WLAN clients to a

DHCP server (at the ISP's location) and then returns the IP information from the DHCP server to the clients.

## **5.2.7 SNTP**

The Ericsson W3x includes a SNTP client which provides a way to synchronize the device's own time of day setting with a remote NTP server. It is possible to specify up to three (3) different SNTP servers (for fallback).

As an alternative, and only available for the Ericsson W35, the time can be fetched from the mobile network (see section 4.5).

## **5.2.8 L2TP Tunneling**

The Ericsson W3x supports one L2TP tunnel providing a mechanism for tunneling Ethernet frames between two peers over an existing network (usually the Internet). The LAN/WLAN is bridged into the tunnel using BCP over PPP over L2TP.

The BCP/PPP/L2TP tunnel can be used to connect a branch office LAN to a corporate office LAN over a 3G/HSPA network connection.

## **5.2.9 Firewall**

The Ericsson W3x includes a stateful packet filtering firewall (using Linux Kernel iptables) applicable between the WAN and WLAN/LAN interfaces.

### **5.2.9.1 Firewall Rules**

Firewall rules are used to specify matching values that a packet must have for this rule to apply to the packet. These values include the following:

- Source or destination IP address
- Source or destination port or range of ports
- Transport protocol (UDP, TCP, IGMP, all).
- Incoming/outgoing interface
- Action; accept, drop, reject, or dscp:0xXX

Up to 50 simultaneous firewall rules can be defined and it is also possible to use the operation "NOT" when defining rules.

### **5.2.9.2 Packet Drop and Reject**

A packet can be either dropped or rejected based on the outcome of the packet classification. If the unit rejects a packet, the sender receives the appropriate ICMP message. If the unit drops a packet, it silently discards the packet.

### **5.2.9.3 Denial of Service (DoS)**

A DoS attack is an attempt by an attacker to prevent legitimate hosts from using a service. The Ericsson W3x supports rate limit of ICMP packets (0-2000) and TCP SYN segments (0-2000).

## **5.2.10 NAT**

The Ericsson W3x supports dynamic one-to-many NAT - also known as NAPT. NAPT translates the source IP address of the LAN to the public WAN IP address. It also changes the source port (UDP or TCP) or the

ICMP for the WAN to LAN flow. Port translation allows several LAN devices to be connected to the WAN through one public IP address.

#### **5.2.10.1 NAT Port Forwarding**

The NAT Port Forwarding feature, sometimes referred to as Virtual Server, redirects traffic from the WAN side to a server on the LAN side.

The Port Forwarding feature requires that the Ericsson W3x has a public IP address for Port Forwarding requests from the Internet to be handled correctly. Public IP for the subscription needs to be provided by the operator.

#### **5.2.10.2 NAT ALGs**

An ALG enables the transfer of specific application streams through NAT. This is enabled by creating dynamic holes in NAT and changing IP addresses in network protocol headers, and if a secondary port is required, the ALG will open one.

The Ericsson W3x includes NAT ALGs for the following protocols:

- FTP
- TFTP
- RTSP
- SIP
- PPTP

The included ALGs can be enabled/disabled individually and do not require any additional configuration.

#### **5.2.11 UPnP IGD**

The Ericsson W3x supports the UPnP standard with respect to the Internet Gateway Device (IGD) profile, used by Microsoft Messenger (among others) to configure port forwarding in a NAT router.

#### **5.2.12 VPN Pass-Through**

The Ericsson W3x supports VPN pass-through from a client on the LAN connecting to a VPN server on the Internet without any configuration. Supported protocols are IPsec and PPTP (Microsoft VPN) with the following limitations:

- The IPsec client and server must support NAT-T (NAT Traversal).
- Only one client at a time can use PPTP, unless the PPTP ALG is enabled.

Other VPN pass-through configurations, such as a VPN server residing on the Ericsson W3x LAN, is also possible provided the appropriate ports/protocols are forwarded.

## 5.2.13 IPsec/VPN Termination

The Ericsson W3x supports one IPsec/VPN tunnel using Site-to-Site configuration (Tunnel mode). An IPsec VPN serves as a point-to-point tunnel interface allowing the Ericsson W3x to send some or all of its WAN traffic across an encrypted tunnel rather than in clear text.

ESP is used to encrypt the payload part of an IP packet and ensures origin authenticity, integrity and confidentiality. 3DES and AES-128 are used as encryption algorithms and SHA-1 and MD5 as hash algorithms. NAT traversal is supported when IPsec is enabled.

### 5.2.13.1 IKE

IKE is the protocol for setting up a shared session secret from which cryptographic keys then can be derived. The Ericsson W3x supports IKE v1 with pre-shared key as method of authentication. 3DES and AES-128 are used as encryption algorithms and SHA-1 and MD5 as integrity/hash algorithms. Group 2 is supported as Diffie-Hellman group identifier.

## 5.2.14 IP Quality of Service

The QoS service in the Ericsson W3x supports the Stochastic Fair Queuing (SFQ) scheduling algorithm which makes sure that no single session can dominate outgoing bandwidth.

The QoS feature applies for upstream traffic only.

## 5.3 USB Services

The Ericsson W3x may function as a network storage device and/or printer server for LAN/WLAN hosts using Windows File and Printer sharing (also known as SMB or CIFS).

When an external hub is connected to the USB connector, the Ericsson W3x supports connection of up to two storage devices and one printer at the same time. Both USB 1.1 and 2.0 (full speed and high-speed) are supported.

The Ericsson W3x uses Samba as the base to implement file and printer sharing through SMB/CIFS.

Linux Kernel auto detection of USB devices (through udev and hotplug) is used as part of the automatic configuration of the storage device and/or printer server. The Ericsson W3x uses a relatively low powered processor and is not designed to be a multi tasking platform.

### 5.3.1 File Sharing

A USB disk drive or memory stick that is connected to the USB connector on the Ericsson W3x is automatically mounted and shared over the LAN (and WLAN, if enabled).

The included files are shared with all devices belonging to the same workgroup and all users have full read/write (including delete) access to the shared files. Only the first partition of a storage device is automatically mounted and shared.

The file system on a shared device needs to be of a supported type otherwise the automatic mounting of the device will not work. The following types are supported:

- FAT; Microsoft legacy file system from MS-DOS with 8.3 character filename system
- FAT32; Microsoft Windows 95 file system based on FAT but with long filename system
- ext2; second extended file system, the standard Linux file system
- ext3; like ext2 but with journaling support.

### 5.3.2

#### **Printer Sharing**

When a printer is connected to the USB connector, the Ericsson W3x automatically creates a local UNIX printer that is shared over the LAN (and WLAN, if enabled) using SMB/CIFS protocol.

## 6 Voice Services (W35 only)

The Ericsson W35 provides circuit switched voice services via the telephony line interface with high speech quality.

### 6.1 National Profiles

Country specific settings for the telephony services can be configured. This can be achieved by setting an overall profile either automatically by loading a profile (based on the SIM card's MCC) when the Ericsson W35 is rebooted or manually by configuring a specific profile.

These settings include parameters for the POTS interface (i.e. impedance, ringing signals, cadence, levels etc), CLIP service configuration, and settings for supplementary services.

National profiles for the following countries are currently supported:

- Austria (AT)
- Australia (AU)
- Spain (ES)
- Hungary (HU)
- New Zealand (NZ)
- Sweden (SE)
- United Kingdom (UK)
- United States (US).

If none of the above methods are used for setting an overall national profile, the following features have their own profiles (for the above described countries) that can be enabled/disabled individually.

Country specific settings for supplementary services are only included in the above described national profile.

#### 6.1.1 Tones and Signals Profile

The tones and signals profile includes local settings for ringing signals and information tones generated by the Ericsson W35 (in opposite to the tones received from the network).

These settings might be overridden by the operator network.

#### 6.1.2 Voice Codec

The Ericsson W25 supports the following voice codecs in all profiles:

- All GSM vocoders
- Enhanced Full Rate /EFR), Full Rate (FR), Half Rate (HR)
- WCDMA Adaptive Multirate (AMR) encoders.



### **6.1.3 Analog Settings Profile**

The analog settings profile defines physical settings for the FxS ports including impedance and nominal gain settings.

### **6.1.4 CLIP Country Profile**

The CLIP country profile includes local settings for the CLIP service.

## **6.2 General Telephony Features**

The following subsections describe telephony related features that can be customized in the Ericsson W35.

### **6.2.1 Inter Digit Timer**

The Inter Digit Timer (IDT) specifies the duration the Ericsson W35 waits to detect the next digit when dialing. After this period, no more digits are expected to arrive and an attempt to establish the call is done.

### **6.2.2 Dial Tone Timeout**

The dial tone timeout specifies for how long the system will wait for the caller to input the first digit after going off-hook.

### **6.2.3 Congestion Tone Timeout**

The congestion tone timeout determines for how long a congestion tone is to be played.

### **6.2.4 Local Ringing Timeout**

The local ringing timeout specifies the maximum time a call will attempt to connect if the B-Party does not answer.

### **6.2.5 DTMF Duration**

This setting determines the DTMF digit signal duration for the regenerated DTMF signals from the network side towards the POTS port.

The duration of the DTMF-tones sent from the Ericsson W35 towards the network is determined by the TE and the network settings and is not configurable in the Ericsson W35.

### **6.2.6 Howler Tone**

The howler tone, used in some countries, is an information-tone of increased intensity that is intended to alert telephone users of the fact that they have left the receiver off the hook.

It is possible to configure when the howler tone should start to play in relation to the start of the previous tone (i.e. busy tone).

### **6.2.7 On/Off-hook Timeouts**

These settings determine the time needed for the Ericsson W35 to consider the phone to be on- or off-hook.

## 6.2.8 Hook Flash Time

This setting controls the “Hook Flash” feature which on most modern phones is implemented as a button that simulates a quick off-hook/on-hook/off-hook cycle. This is the same function as quickly tapping at the hook on an old style phone, also called Register Recall (the R-button).

The setting specifies the time-window in which the on-hook condition exists in order to be interpreted as a hook flash.

## 6.2.9 CLIP

The Ericsson W35 supports CLIP (Calling Line Identification Presentation) service in both on-hook and off-hook states using the DTMF and FSK protocols, supporting both ETSI and Bellcore standards.

It is possible to configure a country specific profile for the CLIP service and also define how to present the incoming numbers in the desired format.

## 6.2.10 On Hold Ring

This setting specifies what will happen if the user goes on-hook with an active call placed on-hold. If enabled, the user will be notified about a remaining on-hold call ring signal. If disabled, all calls will be disconnected when going on-hook.

For each of the FxS ports (“Phone” and “Phone/Fax”), the receiving and transmitting gain can be adjusted, with respect to the nominal relative level.

## 6.3 Dial Process

The Ericsson W35 supports E.164 numbering. E.164 numbers can have a maximum of 15 digits and are usually written with a + prefix.

There are three ways to indicate that the dialed number sequence is complete:

- Dialing the EON key (e.g. # or \*) immediately sends the call.
- An Inter Digit Timer (IDT) is used to check the dialing process.
- A specified number of digits must be dialed before the call is placed.

The EON key is configurable as well as the IDT.

### 6.3.1 Dial Plan

The dial plan consists of a number of rules, defined using regular expressions (ref. POSIX 1003.2). These rules are used to match dialed digits, and provide also the ability to strip/append prefix and suffix digits.

### 6.3.2 Local Call Prefix

A local prefix can automatically be added to a dialed local number. This is useful in places where the PSTN does not require the local prefix in local calls.

### 6.3.3 Fixed Number Dialing

Fixed Number Dialing is supported when a SIM providing this service is installed. When enabled, only calls to fixed numbers stored on the SIM are allowed.

### 6.3.4 Emergency Calls

Emergency calls have its own dial plan and multiple numbers can be configured.

It is possible to place an emergency call (e.g. 112, 911) without having to enter a PIN code, when the PIN lock feature is enabled, without a SIM card present in the unit, or if the device is locked to the network by a specific MCC and/or MNC. This ensures emergency calls will always be established regardless of the configuration of the Ericsson W35.

Emergency numbers are handled as follows:

- If a SIM card is present, emergency number from the dial plan are used.
- If no SIM card is present in the unit, the numbers 112, 911, 000, 08, 110, 999, 118 and 119 are also handled as emergency numbers and will be possible to dial.

## 6.4 Supplementary Services

The UMTS/GSM supplementary service codes (e.g. #67# etc) can be configured with any service code in order to have the same service codes as in a fixed network.

Supplementary services can only be used with a DTMF telephone connected to the Ericsson W35.

The supplementary services described in the following subsections can automatically be customized by setting a national profile. Profiles for the following countries are currently supported: Austria, Australia, Spain, Hungary, New Zealand, Sweden, United Kingdom and United States.

### 6.4.1 Call Waiting

This service enables the caller to be notified of an incoming call during a conversation. The subscriber can then answer, reject, or ignore the incoming call.

The service can also be configured to accept a temporary deactivation by dialing a prefix (e.g. \*70) prior to or during a call. The Call Waiting service will be reactivated when ending the call.

### 6.4.2 Call Management with R-codes

This service enables the caller to interrupt an active call (placing the caller on hold), make a new call and then subsequently, switch between the old and new call. It is also possible to release either of the calls, putting all three in a conference call or "break up" a conference call into two separate

calls or drop the last added party. The exact behavior depends on the configuration.

#### **6.4.3**

#### **CLIR**

The CLIR (Calling Line Identification Restriction) service enables a calling party to prevent presentation of his telephone number to the called party.

The network operator can configure the default CLIR service state for a specific subscriber to be either always restricted, temporary restricted or temporary allowed.

#### **6.4.4**

#### **Call Return**

This service enables a user to call the last unanswered call by dialing a configured service code.

#### **6.4.5**

#### **Delayed Hotline**

This service enables a user to call a particular number (hotline number) by just lifting the handset and wait for a fixed period (delay).

The hotline number must be entered into the Ericsson W35 by the customer prior to use. A prefix is added to the dial plan for the customer hotline number.

Calls cannot be forwarded to emergency numbers.

#### **6.4.6**

#### **Call Forwarding Unconditional**

This service enables a user to immediately have all incoming calls forwarded to another number.

When the service is active, the subscriber will hear a distinct dial tone when attempting to make a call.

Due to configuration in most networks, calls cannot be forwarded to emergency numbers or international numbers.

#### **6.4.7**

#### **Call Forwarding on Busy**

This service enables a user to have all incoming calls, which meet with busy, forwarded to another number.

Due to configuration in most networks, calls cannot be forwarded to emergency numbers or international numbers.

#### **6.4.8**

#### **Call Forwarding on No Reply**

This service enables a user to have all incoming calls, which meet with no reply, forwarded to another number.

Due to configuration in most networks, calls cannot be forwarded to emergency numbers or international numbers.

#### **6.4.9**

#### **Call Forwarding Unreachable**

This service enables a user to have all incoming calls, which meet with unreachable, forwarded to another number.

Due to configuration in most networks, calls cannot be forwarded to emergency numbers or international numbers.

#### 6.4.10


#### **CWI**

The Ericsson W35 supports the CWI (Call Waiting Indication) service over the POTS interface.

#### 6.4.11

#### **Message Waiting**

The subscriber is alerted about new voice mail message(s) by the blinking

**Message** () LED on the Ericsson W35 and by a special information tone that plays when going off-hook.

The **Message** LED and tone is activated when a SMS message is received from a pre-defined number configured in the Ericsson W35, i.e. the service providers' voicemail system. The LED and tone are deactivated when a phone call is placed to a pre-defined number, i.e. the service providers' voicemail number.

## 7 Fax Service (W35 only)

To enable Fax support over the WCDMA network, the Ericsson W35 uses Fax over IP based on SIP (RFC 3261) and the T.38 protocol.

The Ericsson W35 supports G3 fax as specified in ITU-T T.30 Annex A. Older standards, as G1 and G2, and the newer superG3 (sometimes called V.34fax) are not supported.

### 7.1 IMS User Agent

The IMS (SIP) User Agent is associated to the "Phone/Fax" port on the Ericsson W35. This integrated User Agent controls VoIP sessions and manages and controls the media streams by using the SIP protocol towards the SIP Server and Media Gateway.

### 7.2 IMS Call Server

The IMS User Agent requires access to one or more IMS Call servers (also called SIP proxy/servers). A list can be created with configuration details for different SIP server/proxy settings and possibly an outbound proxy.

### 7.3 Media Codec

The Ericsson W35 supports the following CODECs:

- G.711a-law (used for VoIP)
- G.711u-law (used for VoIP)
- T.38 (used for Fax services).

#### 7.3.1 G.711a-law / GG.711 u-law

The G.711a-law and G.711u-law CODECs are used for VoIP and the settings include Voice Activity Detection (VAD); enable/disable silence suppression, and the RTP payload size.

#### 7.3.2 T.38

The T.38 settings are used for Fax and even if the parameter name says T.38 most of the items are basically T.30 settings.

Depending on radio network characteristics there might be a need for fine tuning the T.38 parameters.

### 7.4 Timers

The following fax related timers can be configured in the Ericsson W35.

#### 7.4.1 SIP Timers

Since the delay in the radio network is a little bit longer than in a wired network, it might be needed to adjust the SIP timers (T1, T2, T4 and

transaction timeout) to better fit the network. The default values are adjusted for the radio network, but might need some fine tuning.

#### **7.4.2 Registration Timers**

The registration timers are used when the Ericsson W35 sends a SIP registration message to the SIP server/registrar.

#### **7.4.3 VoIP Session Timeout**

To avoid that the "Phone/Fax" port is used as a telephony port using VoIP it is possible to restrict for how long a voice call is allowed. If no fax tones are detected, i.e. switching over to T.38, within a certain time, the call is teared down by the Ericsson W35.

### **7.5 Security**

The Ericsson W35 authenticates towards the VoIP system using the HTTP Digest Authentication mechanism.

### **7.6 Media Stream**

Due to the procedure of setting up a fax call both G.711 and T.38 is supported by the Ericsson W35. First a call is setup as a normal voice connection (using G.711) before a switchover to T.38 is done (using SIP Re-INVITE practices).

#### **7.6.1 Jitter Buffer**

To handle latency and jitter in the IP network the Ericsson W35 has a jitter buffer. The access network contributes with most of the latency and jitter, so to reduce this a HSPA connection is recommended.

#### **7.6.2 Echo Canceller**

To improve the fax transfer, the Ericsson W35 has an echo canceller in accordance with G.168.

#### **7.6.3 QoS**

The outgoing VoIP related traffic will be prioritized before other traffic from the Ericsson W35 to reduce the uplink delay and jitter.

### **7.7 Interoperability**

The Ericsson W35 is interoperable with e.g. Broadsoft, which is included in Ericsson's IMT (IMS Multimedia Telephony). Other SIP servers and Media Gateways should also work as long as they support SIP v2 (RFC 3261) and T.38, but interoperability testing needs to be done to verify this.

## 8 Wireless LAN (WLAN) Features

The Ericsson W3x can be used as a wireless Ethernet router, connecting to wireless PCs according to the IEEE 82.11b/g standards.

The WLAN interface can be enabled/disabled.

The preferred WLAN data rate can be configured to be either B-G-MIXED-MODE, G-MODE-ONLY, B-MODE-ONLY or B-MODE LEGACY.

To avoid interference with other wireless networks, the transmit power level can be changed in the range 0 – 20 dBm.

### 8.1 SSID

The Ericsson W3x supports single SSID. This SSID and a unique MAC address are broadcasted in the beacon at regular intervals.

The SSID can be set (changed) with a maximum length of 32 alphanumeric characters.

It is also possible to configure the SSID to be hidden. In this case the SSID will not be broadcasted and local wireless clients will not find the SSID when scanning the air.

### 8.2 Region

To make sure the Ericsson W3x transmits on correct radio frequencies according to national regulations, the region where the device is used must be stated.

The following regions are currently supported:

- Europe (EU)
- United States (US)
- Canada (CA)
- South Africa (ZA)
- Australia (AU)
- New Zealand (NZ)
- Malaysia (MY)
- Singapore (SG)
- Chile (CL).

### 8.3 Channel Selection

The channel number determines the channel used by the device to pass traffic to clients. A channel number can be manually set and valid channels numbers are 1-13 except if region is set to US or Canada when valid channels are 1-11, or Chile with valid channels 2-10.



By enabling the “Automatic Channel Selection” feature, the radio will scan each valid channel and automatically select a channel with no activity. If there are not channels without activity, the one with the lowest activity is selected (or random if lowest activity is equal). When this feature is enabled, the Ericsson W3x will select the best channel upon every restart.

## **8.4 Wireless Security**

Authentication and data encryption are used to restrict access to the wireless network. Which authentication and encryption method that should be used depends on what is supported by the connecting wireless device(s).

Wireless security can be configured to be either “open” (no authentication or encryption) or “closed” (meaning WEP-64, WEP-128, WPA, WPA2 or WPA/WPA2 Mixed security). WPA/WPA2 Mixed security mode enables connection of both WPA and WPA2 clients. See below for security details.

### **8.4.1 WEP**

WEP enables wireless security using 64-bit or 128-bit data encryption. WEP encryption requires a private network key. Each device in the wireless network has to be manually configured with this key.

### **8.4.2 WPA / WPA2**

WPA is a 256-bit data encryption method with keys that dynamically change over time. WPA and its successor WPA 2 are considered to be the most reliable security options.

For user authentication WPA/WPA2 runs a special, easy-to-set-up home mode called Pre-Shared Key (PSK) where keys and passphrases are manually entered.

WPA encryption uses the Temporal Key Integrity Protocol (TKIP) while WPA2 encryption follows the Advanced Encryption Standard (AES).

### **8.4.3 Whitelist**

A common method of restricting WLAN network access is to specify the MAC address(es) in a so called “whitelist” for those devices to be granted access to the WLAN. This kind of whitelist is also known as “MAC Association” or “MAC Access list”.

Up to 20 MAC addresses for wireless clients can be added to the whitelist. Once the whitelist has been enabled, only clients with an associated MAC address are allowed to connect.

This feature does not require any configuration of the clients but on the other hand it does not encrypt the traffic like WEP/WPA.

# 9 Configuration and Management

## 9.1 Web User Interface

The end-user configures the Ericsson W3x through a password protected web user interface (WUI) that is accessible from the LAN and WLAN interfaces.

From the WUI, the end-user is allowed to access functions and configuration parameters related to WAN authentication, LAN settings, NAT and port forwarding, WLAN access point and USB file and printer sharing.

The WUI also includes a Configuration Wizard for easy setup of the local wireless network.

## 9.2 Command Line Interface

The CLI is mainly intended for operator service personnel handling tasks like storing/exchanging configuration files and for maintenance purpose (i.e. fault location and tracing).

Remote access to the CLI is possible using SSH2 and local access to the CLI is provided through Telnet.

By default there are two accounts available for accessing the CLI:

- The operator (user-id **operator**), in addition to the end-user privileges also is allowed to access additional WAN related configuration parameters, telephony service parameters (W35 only), configuring the firewall, IPsec/VPN termination, L2TP tunneling, CWMP and troubleshooting.
- An administrator account (user-id **root**), with full permissions.

## 9.3 Management Tools

### 9.3.1 Software Update

The Ericsson W3x runs Linux OS. The flash file system is formatted as two partitions, each capable of holding a complete software image. If a software update process should get interrupted, e.g. power failure during the update process, there is always a last known good firmware image to boot from.

Software updates can be performed either manually using the FTP or HTTP(s) protocols, or automatically using TR-069 (CWMP).

#### 9.3.1.1 Manual Software Update

Manual software updates is supported from FTP or HTTP(s) servers. The image file can also be fetched from the local file system, which includes whatever is mounted as USB storage.

When an update is initiated, the image file is downloaded using standard TCP/IP protocol specified by the URL or path to a local file. Before the update process is started, the file is checked for inconsistencies.

It is also possible to upgrade the software via the WUI from a locally stored file. This feature can be configured from the CLI to be blocked (invisible) in the WUI.

### **9.3.2 Remote Management using TR-069**

The Ericsson W3x includes a remote management agent supporting the CPE WAN Management Protocol (CWMP) as specified in DSL Forum TR-069 (short for Technical Report 069) Amendment II.

CWMP defines an application layer protocol for remote management of end-user devices and provides the communication between a CPE and a TR-069 capable Auto Configuration Server (ACS).

The Ericsson W3x is configured with parameters relating to the association with an ACS, credentials for an ACS when making a connection request to the Ericsson W3x as well as time settings for when the Ericsson W3x should send CPE information to the ACS.

The Ericsson W3x remote management agent supports remote software image installation, shell script execution and a set of configuration and status parameters.

### **9.3.3 Backup and Restore Configuration**

To preserve the running configuration, a backup copy of all accessible values can be stored in a local file. In case of a system failure or a corrupted configuration, the system can be restored from a backup file.

### **9.3.4 Reset to Default Configuration**

A reset to default configuration can be done either from the CLI, WUI or by using the physical Reset button on the unit.

#### **9.3.4.1 Create own Default Configuration File**

It is possible to save the running configuration as a new default configuration file which then can be imported to the CDB.

### **9.3.5 System Log**

The Ericsson W3x includes a system log accessible both from the CLI and WUI as a text file.

The system logging information is written to 5 files which are rotated in a circular fashion. The files are limited to 200Kbytes each, which equals a maximum of 1 MB total logging information. The files are not saved to flash and will be lost when rebooting or when power is disconnected.

When persistent logging is enabled, the log files are written to flash memory in two files alternately.

The syslog events can be saved to a local file or forwarded to a remote syslog server.

Different levels of logging can be set depending on how much information is desired.

Message types are specific to the logged information:

- Emergency, alert, critical and error messages report important operation errors (e.g. a task crashed).
- Warning, notice and inform messages report important operation information (e.g. system attack).
- Debug messages report operation details.

#### 9.3.5.1 **BSD Syslog Remote Logging**

The Ericsson W3x is able to distribute the system log to a remote host using the BSD Syslog message format on UDP.

In order to identify specific devices in a network, the product serial number is also retrieved and sent as a parameter when the syslogd daemon is initialized for remote logging.

#### 9.3.5.2 **Syslog Heartbeat**

A regular heartbeat message can be sent to the syslog with a configurable interval. The heartbeat messages will be classified as an alarm to simplify the forwarding of this message to a remote syslog.

### 9.3.6 **Fault Management**

If an error condition occurs, the **Alarm** LED on the unit is blinking and the corresponding cause is displayed in the WUI (on the Overview page). An event message with severity level "Error" is also generated in the syslog.

Events that generate an alarm are such that make it impossible to send or receive data, e.g. SIM card missing.

## 9.4 **Interface Status and Statistics**

The following subsections describe the status/statistics information that can be displayed from the CLI and the WUI.

### 9.4.1 **Basic System Information**

The following basic system information can be displayed:

<b>Basic System Information (CLI and WUI)</b>	Product Product ID Serial Number Boot Loader Application Software UMTS Boot Loader UMTS Application Software Ethernet MAC Address WLAN MAC Address IMEI
---	--

## 9.4.2

### LAN Interface

The following information about the LAN interface can be displayed:

<b>LAN interface (CLI)</b>	Port status (Up/Down) for each physical LAN port. Ethernet MAC address. LAN IP address and subnet mask. Traffic statistics; Transmitted and received packets.
<b>LAN interface (WUI)</b>	LAN IP address and subnet mask DHCP server IP address range and lease time. Current DHCP leases. Port status (Up/Down) for each physical LAN port.

## 9.4.3

### WAN Interface

The following information about the WAN interface can displayed:

<b>WAN interface (CLI)</b>	Type of connection: HSPA, UMTS, EDGE, GPRS or GSM Operator; Name, MCC and MNC APN Location; LAC and CI Network registration RSSI for GSM/GPRS/EDGE Average CQI <sup>(1)</sup> Strongest cells <sup>(2)</sup> ; Signal Level: Ec/Io and RSCP  WAN IP address and netmask DNS IP addresses Traffic statistics; Transmitted and received packets Error, Overruns and Dropped packets Transmitted/received current and previous month.
<b>WAN interface (WUI)</b>	Signal strength (visual quality bars) <sup>(3)</sup> Link status; Up/Down Mode Type of connection Service provider APN Network registration IP address DNS IP addresses  Traffic statistics; Transmitted and received packets Error, Overruns and Dropped packets Transmitted/received current and previous month.

(1) The “Average CQI” (Channel Quality Indicator) is only displayed when a HSPA link is up and running (has downlink traffic).

(2) The “Strongest cells” part shows signal information for the three strongest cells that the unit currently uses for connection.

(3) The visual signal quality bars are not only based on signal strength (RSCP). It also takes the EC/I0 (energy to noise and interference ratio), since the bandwidth is depended on both values.

#### 9.4.4 WAN Interface Statistics

The following information about WAN interface statistics can be displayed from the CLI:

<b>WAN interface statistics (CLI)</b>	RSCP values (dBm) EC/I0 values (dB)  A value for each 15 minutes interval for 24 hours (24 hour clock) is displayed. For each daily interval for 1 month the minimum, average and maximum value is displayed.
---------------------------------------	--

An RSCP threshold can be configured and when the current RSCP level is below the configured alarm threshold, an alarm is raised and sent to both syslog and remote syslog.

#### 9.4.5 L2TP Tunnel Status

The following information about a configured L2TP tunnel can be displayed:

<b>L2TP tunnel status</b>	UP / DOWN Received/transmitted bytes. Tunnel uptime.
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#### 9.4.6 IPsec/VPN Tunnel Status

The following information about a configured IPsec/VPN tunnel can be displayed:

<b>IPsec tunnel status</b>	UP / DOWN Received/transmitted bytes.
----------------------------	--

#### 9.4.7 Firewall Status

The firewall status information (in the CLI) shows all configured firewall rules and packets per rule.

#### 9.4.8 WLAN Interface

The following information about the WLAN interface can be displayed:

<b>WLAN interface (CLI and WUI)</b>	Connected devices; Current associations (MAC address) Whitelist; Current successful authenticated associations (MAC address)
-------------------------------------	---

## 9.4.9

### USB Interface

The following status information about the USB interface can be displayed:

<b>USB interface (CLI)</b>	Device Id Vendor Product Class Speed File System Capacity Used
<b>USB interface (WUI)</b>	Device Id Share name

## 9.4.10

### Telephony Interface (W35 only)

The following status for the telephony interfaces (ports) can be displayed:

<b>Telephony interface (CLI)</b>	Telephony Line Status (for each line; 0 and 1) Type State Codec Registration status SIP server Las call made at Last call direction
----------------------------------	--

## 9.4.11

### Power Management (W35 only)

The following information about power management can be displayed:

<b>Power management (CLI)</b>	Power failures (times) Battery runouts (times) Time on battery (seconds).
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## 9.5

### Security Management

All invalid login attempts are recorded in the System Log.

When attempting to log in remotely via SSH or locally via Telnet, the user is given three login attempts and then the session is ended.

## 9.6

### TEMS Investigation Support

The Ericsson W3x supports TEMS Investigation.

TEMS Investigation is the industry-leading tool for troubleshooting, verification, optimization, and maintenance of mobile networks.

TEMS Investigation connects to the Ericsson W3x via a virtual serial port on a computer to the Ericsson W3x over the Ethernet interface. The computer that runs the TEMS investigation tool needs a virtual serial driver as well.

For further information about TEMS Investigation, see the following link:  
[http://www.ericsson.com/solutions/tems/realtime\\_diagnostics/investigation.shtml](http://www.ericsson.com/solutions/tems/realtime_diagnostics/investigation.shtml)



# 10 Regulatory Information

## 10.1 Approvals

The Ericsson W3x is certified with EU Directives for the CE mark, Safety approvals, EMC and Radio Spectrum approvals and RF Exposure approvals for the following markets:

- EU
- USA
- Canada
- Australia
- New Zealand
- Malaysia
- South Africa
- Singapore.

## 10.2 WiFi Compliance

The Ericsson W3x has been tested for interoperability with the WiFi standard (the global industry-standard for local wireless networking) and supports all WiFi certified client devices.

## 10.3 RoHS Compliance

The Ericsson W3x meets the requirements of the European RoHS directive (2002/95/EC).

## 10.4 USB Compliance

The Ericsson W3x meets the requirements in the USB-IF Compliance Program for systems.

## 10.5 WEEE Directive

The Ericsson W3x meets the requirements in the WEEE directive and are marked accordingly.

## 10.6 SAR

SAR (Specific Absorption Rate) measurements are performed on the Ericsson W3x to establish compliance with national and international RF limits.

## 10.7 Environmental

The Ericsson W3x meets the following requirements for operational condition:

- Temperature: 0°C to +45°C.

- Humidity: 5% to 95% RH, non-condensing.

## 10.8

### **Intended Use**

The Ericsson W3x is designed and approved for private and public use in an indoor location. Any attached cabling must remain internal to the building.

# 11 Antenna Characteristics

This chapter shows the antenna patterns for the internal UMTS/GSM antennas in the Ericsson W3x.

## 11.1 Measurement Positions

The following measurements positions have been used:

Azimuth Plane	Elevation1 Plane	Elevation2 Plane
<b>Theta</b>	Vertical field of measured plane	
<b>Phi</b>	Horizontal field of measured plane	

### Azimuth Plane

Radiation pattern in the horizontal plane (rotation around the Y axis) with the measurement probe placed in the horizontal plane.

### Elevation1 Plane

Radiation pattern (rotation around the X axis). Measurement from the side with the measurement probe placed in the vertical plane.

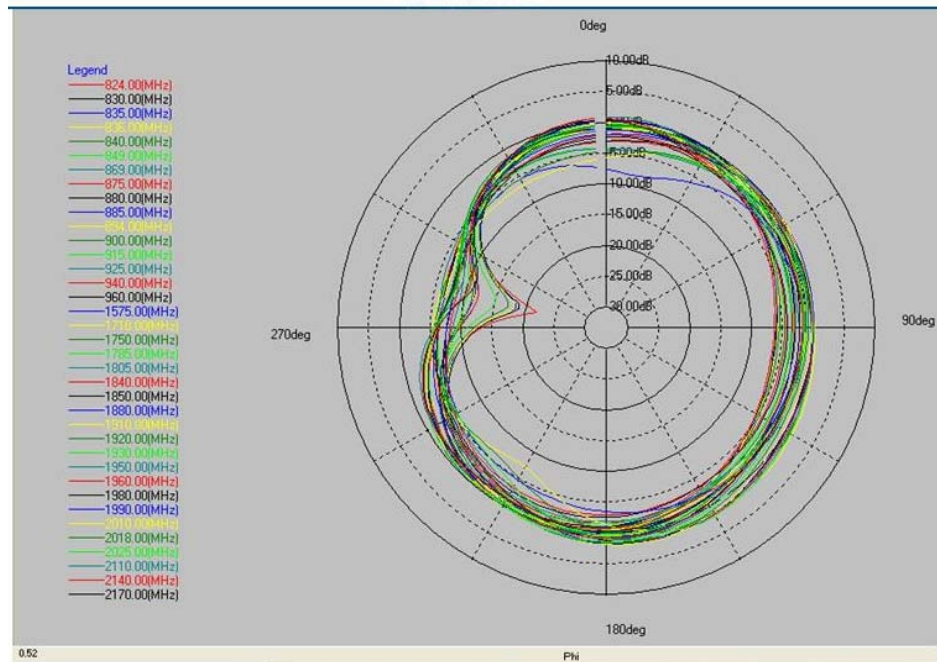
### Elevation2 Plane

Radiation pattern (rotation around the Z axis). Measurement in front of the unit with the measurement probe placed in the vertical plane.

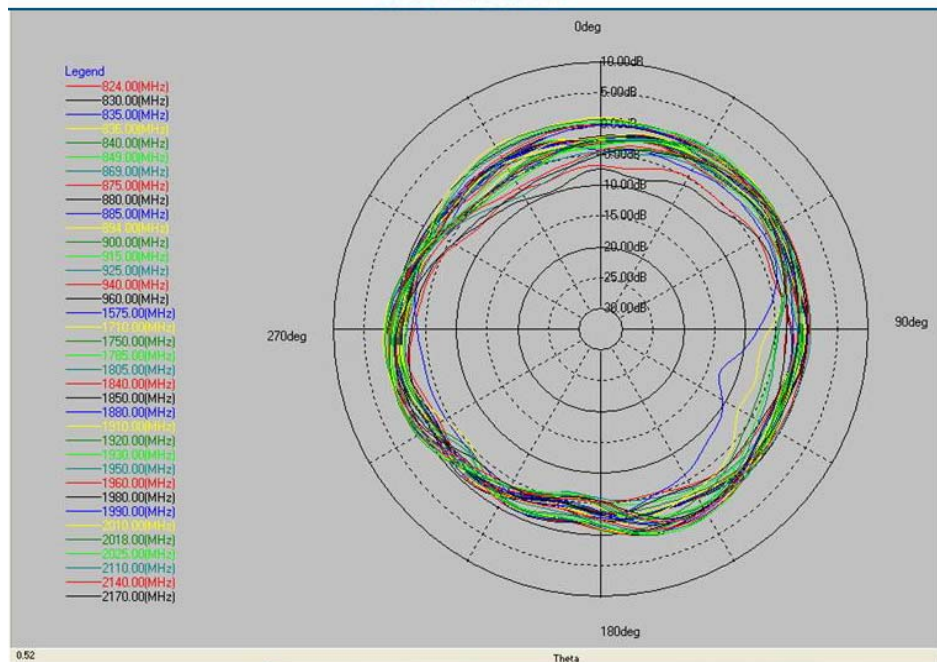
## 11.2

## Radiation Patterns for the Main Antenna

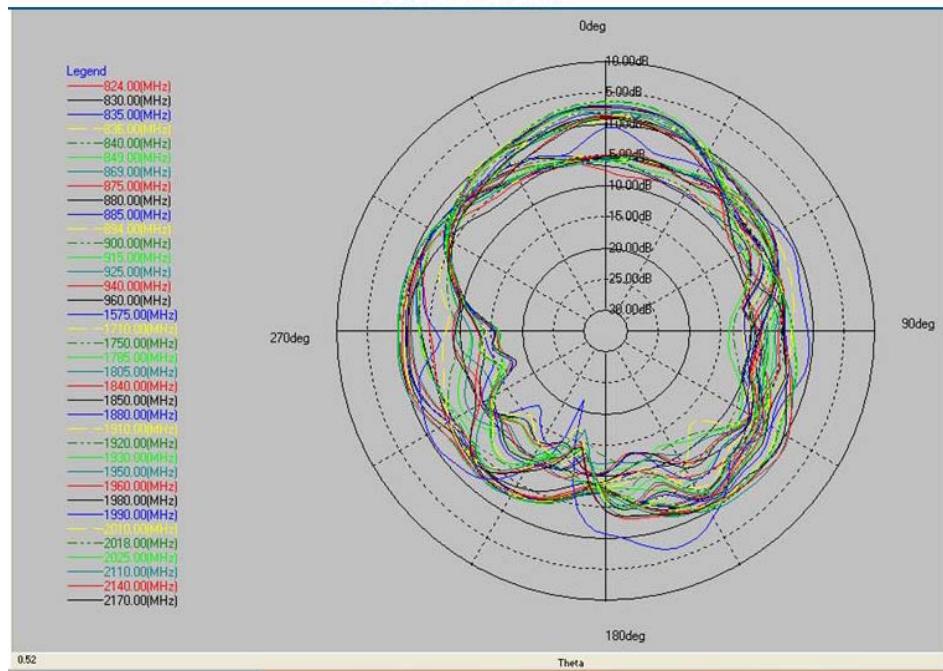
### AZIMUTH



### ELEVATION 1

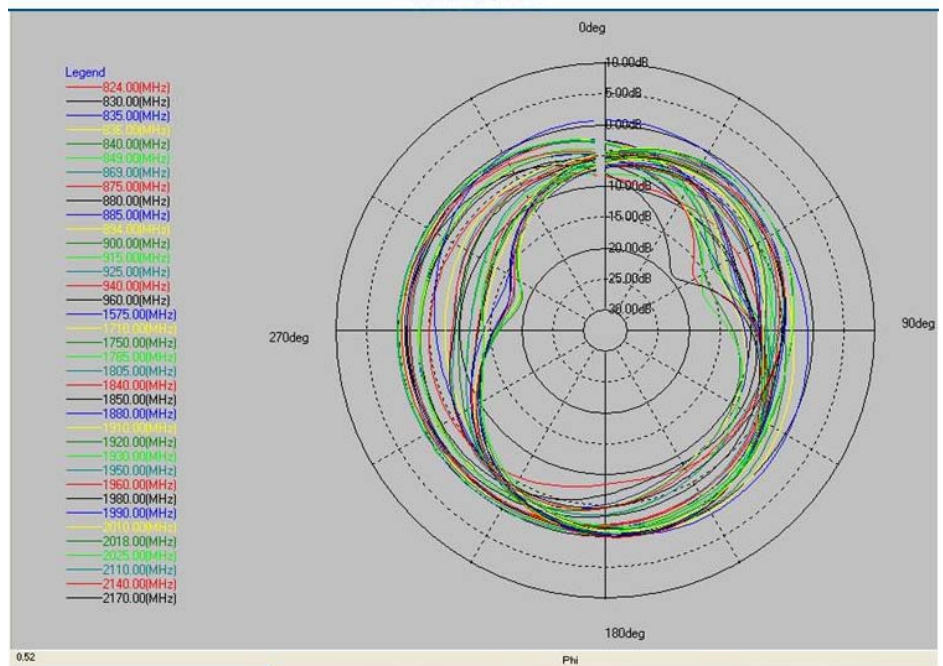


## ELEVATION 2

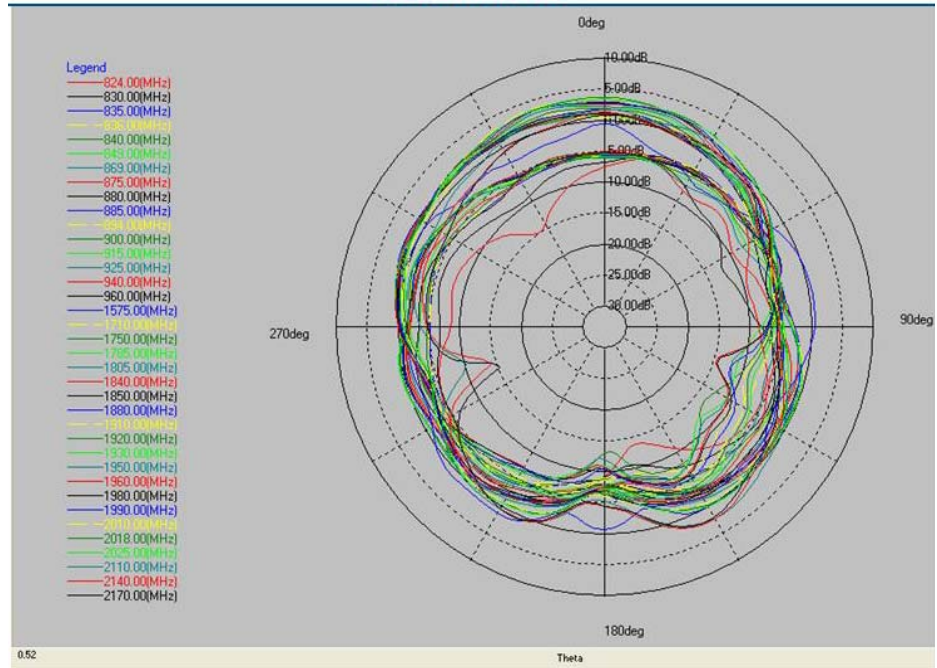


## 11.3 Radiation Patterns for the Auxiliary Antenna

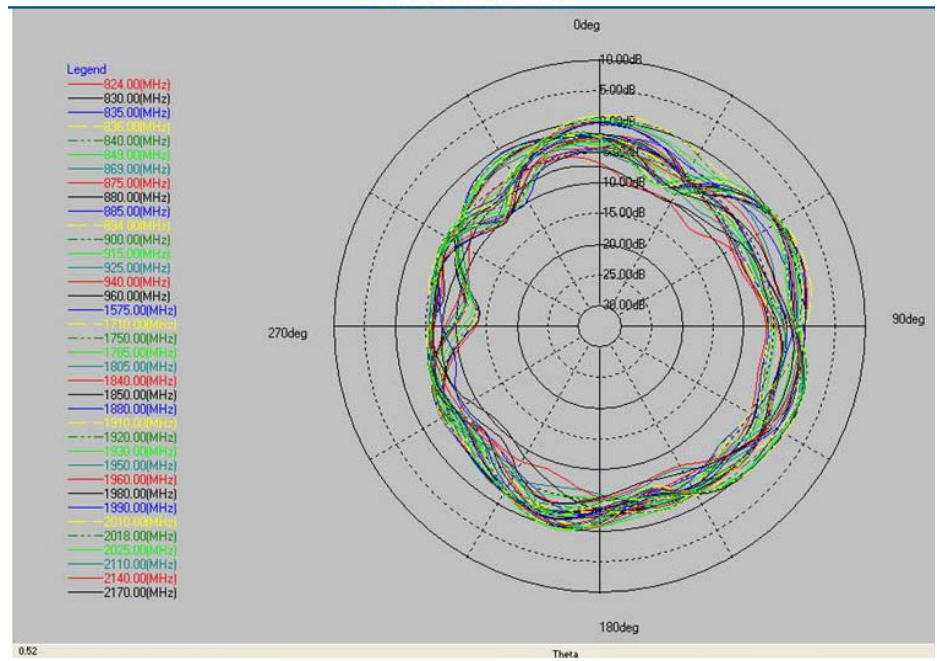
### AZIMUTH



## ELEVATION 1



## ELEVATION 2



## 12

# Acronyms and Abbreviations

**ACS**

Auto Configuration Server

**AES**

Advanced Encryption Standard

**ALG**

Application Layer Gateway

**AES**

Advanced Encryption Standard

**AP**

Access Point

**APN**

Access Point Name

**CDMA**

Code Division Multiple Access

**CHAP**

Challenge Handshake Authentication Protocol

**CIFS**

Common Internet File System

**CLI**

Command Line Interface

**CLI**

Calling Line Identification

**CLIP**

Calling Line Identification Presentation

**CLIR**

Calling Line Identification Restriction

**CQI**

Channel Quality Indicator

**CWI**

Call Waiting Indication

**DHCP**

Dynamic Host Configuration Protocol

**DNS**

Domain Name System (or Service)

**DTMF**

Dual Tone Multi Frequency (signaling)

**EDGE**

Enhanced Data rates for Global Evolution

**EON**

End Of Number

**FSK**

Frequency-Shift Keying

**FTP**

File Transfer Protocol

**FWT**

Fixed Wireless Terminal

**FXS**

Foreign eXchange Station

**G3**

Group 3 (Fax protocol)

**GPRS**

General Packet Radio Service

**GSM**

Global System for Mobile Communication

**HSPA**

High Speed Packet Access

**ICMP**

Internet Control Message Protocol

**IDT**

Inter Digit Time

**IEEE**

Institute of Electrical and Electronics Engineers

**IKE**

Internet Key Exchange

**IMEI**

International Mobile Equipment Identity

**IMSI**

International Mobile Subscriber Identity

**IP**

Internet Protocol

**IPv4**

Internet Protocol version 4

**IPsec**

Internet Protocol Security

**L2TP**

Layer 2 Tunneling Protocol

**LAN**

Local Area Network

**LED**

Light Emitting Diode



<b>MBR</b> Mobile Broadband Router	<b>SMS</b> Short Message Service
<b>MCC</b> Mobile Country Code	<b>SNTP</b> Simple Network Timing Protocol
<b>MNC</b> Mobile Network Code	<b>SSH</b> Secure Shell
<b>NAT</b> Network Address Translation	<b>SSID</b> Service Set Identifier
<b>PAP</b> Password Authentication Protocol	<b>TCP</b> Transmission Control Protocol
<b>PIN</b> Personal Identification Number	<b>TEMS</b> TEst Mobile Stations
<b>POTS</b> Plain Old Telephone Service	<b>TFTP</b> Trivial File Transfer Protocol
<b>PPP</b> Point-to-Point Protocol	<b>TKIP</b> Temporal Key Integrity Protocol
<b>PPTP</b> Point-to-Point Tunneling Protocol	<b>UDP</b> User Datagram Protocol
<b>PRL</b> Preferred Roaming List	<b>UPnP</b> Universal Plug and Play
<b>PSK</b> Pre-Shared Key	<b>UMTS</b> Universal Mobile Telecommunications Service
<b>PSTN</b> Public Switched Telephony Network	<b>USB</b> Universal Serial Bus
<b>PUK</b> Personal Unblocking Key	<b>VAD</b> Voice Activity Detection
<b>QoS</b> Quality of Service	<b>VoIP</b> Voice over IP
<b>RIP</b> Routing Information Protocol	<b>VPN</b> Virtual Private Network
<b>RSCP</b> Received Signal Code Power	<b>WAN</b> Wide Area Network
<b>RSSI</b> Received Signal Strength Indicator	<b>WCDMA</b> Wideband CDMA
<b>RTSP</b> Real Time Streaming Protocol	<b>WEP</b> Wired Equivalent Privacy
<b>SFQ</b> Stochastic Fair Queuing	<b>Wi-Fi</b> Wireless Fidelity
<b>SIM</b> Subscriber Identity Module	<b>WLAN</b> Wireless LAN
<b>SIP</b> Session Initiation Protocol	<b>WPA</b> WiFi Protected Access
<b>SMB</b> Server Message Block	



**WUI**  
Web User Interface

