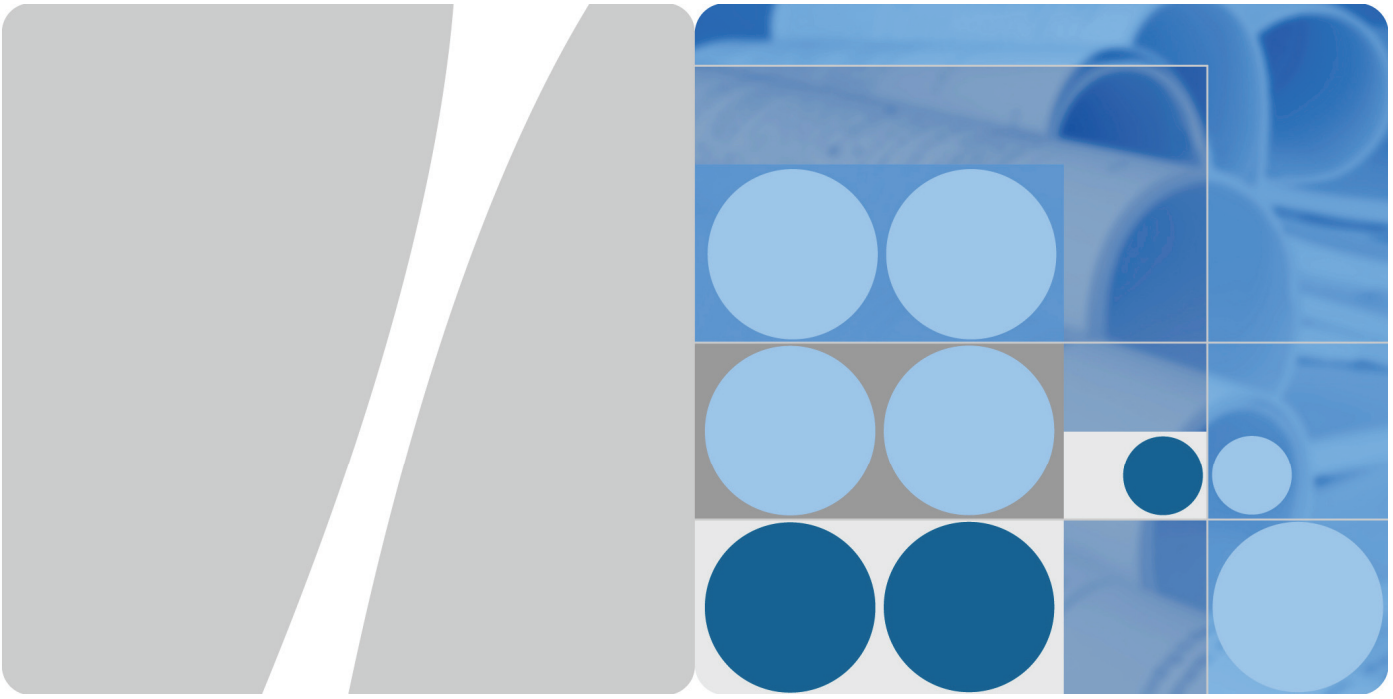
Product Description



HUAWEI E870 HSPA Data Card
V100R001

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Summary

This document provides information about the major functions, supported services, system architecture, and technical references of HUAWEI E870 HSPA USB Modem (hereinafter referred to as the E870).

This document includes:

Chapter	Details
1 Overview	The supported network modes, basic services and functions, and the appearance of the E870.
2 Features	The supported features and technical specifications of the E870.
3 Services and Applications	The services and applications of the E870.
4 System Architecture	The architecture of the E870.

Chapter	Details
5 Packing List	The technical references of the E870.
6 Technical Reference	The items contained in the package of the E870.

History

Issue	Details	Date	Author	Approved by
01	Creation	2007-03-14	Xxx xxx	Xxx xxxxxx

Contents

1 Overview

HUAWEI E870 Data Card (hereinafter referred to as the E870) is a multi-mode wireless terminal for mobile professionals.

The E870 supports the following standards:

- High speed downlink packet access (HSDPA)
- High speed uplink packet access (HSUPA)
- Universal Mobile Telecommunications System (UMTS)
- Global system for mobile communications (GSM)
- General packet radio service (GPRS)
- Enhanced data rates for global evolution (EDGE)

The E870 supports the following services:

- WCDMA/EDGE/GPRS packet switched (PS) domain data services and short messaging service (SMS)
- WCDMA/GSM circuit switched (CS) domain SMS

You can insert the E870 to the ExpressCard interface of a laptop. In the service area of the HSPA/WCDMA/GPRS/EDGE/GSM network, your can surf the Internet and send/receive messages or e-mails cordlessly. With fast speed, reliable performance, and easy operation of the E870, you can experience more in mobile life.

Figure 1-1 shows the profile of the E870.

Figure 1-1 E870 profile

2 Features

2.1 Main Features

The E870 supports the following:

- UMTS FDD Band I, UMTS FDD Band II, UMTS FDD Band V
- GSM/GPRS/EDGE 850 MHz/900 MHz/1800 MHz/1900 MHz
- WCDMA 2100MHz receive diversity
- HSDPA PS domain service of up to 7.2 Mbit/s downlink (DL)
- HSUPA PS domain service of up to 2 Mbit/s uplink (UL)
- WCDMA PS domain data service of up to 384 kbit/s UL/DL
- EDGE PS domain data service of up to 236.8 kbit/s UL/DL
- GPRS PS domain data service of up to 85.6 kbit/s UL/DL
- CS domain SMS based on WCDMA/GSM and SMS group sending
- PS domain data service based on WCDMA/EDGE/GPRS
- PS domain SMS based on WCDMA/EDGE/GPRS and SMS group sending
- High-capacity SMS inbox
- PC/SC Driver function
- The Plug&Play function that the driver is installed when the E870 is inserted to a laptop

2.2 Technical Specifications

2.2.1 Hardware

Table 2-1 lists the hardware specifications of the E870.

Table 2-1 Hardware specifications

Item	Description
Technical standards	• HSDPA/WCDMA: 3GPP FDD R5, HSUPA R6 • GSM/GPRS/EDGE: 3GPP R4

Item	Description	
Operating frequency	UMTS FDD Band V	• UL: 824–849 MHz • DL: 869–894 MHz
	UMTS FDD Band II	• UL: 1850–1910 MHz • DL: 1930–1990 MHz
	UMTS FDD Band I	• UL: 1920–1980 MHz • DL: 2110–2170 MHz
	GSM/GPRS/EDGE 850 MHz	• UL: 824–849 MHz • DL: 869–894 MHz
	GSM/GPRS/EDGE 900 MHz	• UL: 880–915 MHz • DL: 925–960 MHz
	GSM/GPRS/EDGE 1800 MHz	• UL: 1710–1785 MHz • DL: 1805–1880 MHz
	GSM/GPRS/EDGE 1900 MHz	• UL: 1850–1910 MHz • DL: 1930–1990 MHz
External interface	ExpressCard interface	ExpressCard Standard 1.1, ExpressCard/54 or ExpressCard/34 Slot

Item	Description	
	LED	• When the E870 is inserted to the ExpressCard slot of a laptop, the LED blinks the green light. The LED is on for 100 ms and off for 100 ms. Then it is on for 100 ms and off for 2700 ms. • When the E870 registers to the GSM/GPRS network, the LED blinks the green light. The LED is on for 100 ms and off for 2900 ms. • When the E870 registers to the UMTS network, the LED blinks the blue light. The LED is on for 100 ms and off for 2900 ms. • When the E870 connects to the GPRS/EDGE network, the LED is always on and in green. • When the E870 connects to the UMTS network, the LED is always on and in blue. • When the E870 connects to the HSDPA network, the LED is always on and in cyan. • When the E870 is removed from a laptop, the LED is off.
	Antenna interface	SSMB
	SIM/USIM card interface	Standard 6-pin SIM card interface
Maximum transmitting power	• WCDMA/HSPA 2100MHz/1900MHz/850MHz: + 24 dBm (Power Class 3) • GSM/GPRS 850MHz/900 MHz: +33 dBm (Power Class 4) • GSM/GPRS 1800 MHz/1900 MHz: +30 dBm (Power Class 1) • EDGE 850MHz/900 MHz: +27 dBm (Power Class E2) • EDGE 1800 MHz/1900 MHz: + 26 dBm (Power Class E2)	
Static receiving sensitivity	• WCDMA/HSPA 2100 MHz/1900MHz/850MHz: compliant with 3GPP TS 25.101 (R5) • GSM/GPRS/EDGE 850MHz/900 MHz/1800 MHz/1900 MHz: compliant with 3GPP TS 05.05 (R99)	
Power consumption	Average < 3 W	

Item	Description	
Power supply	• Input voltage: 3.0–3.6 V • Input current < 1A • Powered by ExpressCard slot	
Dimensions (L × W × H)	112.5 mm × 34 mm × 10.5 mm	
Weight	< 60 g	
Temperature	Operating	–10℃ to +55℃
	Storage	–20℃ to +70℃
Humidity	5% to 95%	

Note:
- 3GPP = The 3rd Generation Partnership Project
- LED = light-emitting diode
- SIM = subscriber identity module
- UMTS = universal mobile telecommunications system
- USIM = UMTS subscriber identity module

2.2.2 Antenna

Table 2-2 lists the main antenna specifications of the E870.

Table 2-2 Main antenna specifications

Item	Description
Frequency range	• 824–960 MHz • 1710–2170 MHz
Input impedance	50 Ω
Voltage standing wave ratio	≤ 4
Peak gain	≥ –2 dbi
Power capacity	4 W
Polarization	Linear polarization

Table 2-3 lists the sub-antenna specifications of the E870.

Table 2-3 Sub-antenna specifications

Item	Description
Frequency range	2110–2170 MHz
Input impedance	50 Ω
Voltage standing wave ratio	≤ 4
Peak gain	≥ –5 dbi
Power capacity	4 W
Polarization	Linear polarization

2.2.3 Software

Table 2-4 lists the software specifications of the E870.

Table 2-4 Software specifications

Item	Description	
Data service	GSM CS	• UL: 9.6/14.4 kbit/s • DL: 9.6/14.4 kbit/s
	GPRS	• UL: 85.6 kbit/s (compliant with Multislot Class 12) • DL: 85.6 kbit/s
	EDGE	• UL: 236.8 kbit/s (compliant with Multislot Class 12) • DL: 236.8 kbit/s
	WCDMA CS	• UL: 64 kbit/s • DL: 64 kbit/s
	WCDMA PS	• UL: 384 kbit/s • DL: 384 kbit/s
	WCDMA with HSDPA PS	DL: 7.2 Mbit/s
	WCDMA with HSUPA PS	UL: 2 Mbit/s
SMS	• Based on PS domain of WCDMA/EDGE/GPRS • Based on CS domain of WCDMA/GSM	
Operating	Windows 2000/Windows XP/Windows Vista/MAC OS	

Item	Description
system	Minimum requirements: • Card slot: ExpressCard/54 slot or ExpressCard/34 slot • CPU frequency: 866 MHz • Memory: 128 MB RAM • Spare hard disk capacity: 100 MB • Resolution: 800 × 600 Recommended configuration: • CPU: 866 MHz Pentium or above • Memory: 128 MB or above • Spare hard disk capacity: 100 MB or above • Resolution: 1024 × 768 or above

2.2.4 Dashboard

Table 2-5 lists the dashboard specifications of the E870.

Table 2-5 Dashboard specifications

Item	Description
SMS	Writing: You can enter up to 500 English letters or 250 Chinese characters each time.
	Sending/Receiving: A message can contain up to 160 English letters or 70 Chinese characters.
	Splitting: A message that contains more than 160 English letters or 70 Chinese characters is split into multiple messages to send.
	Group sending: You can send a message to up to 20 recipients each time.
	Storage • The SIM/USIM card capacity decides how many messages can be stored in the outbox/inbox/draft box/delivery report box of the SIM/USIM card. • The hard disk space decides how many messages can be stored in the outbox/inbox/draft box/delivery report box of a laptop.
	Sorting: You can sort messages by the sender/recipient name, send/receive time, phone number, and content and so on.
	Importing: You can import messages form the SIM/USIM card to a laptop.

Item	Description
	Ringtone: Message ringtone is supported (can be customized).
Flow display and statistics (data service)	Current connection: • Duration • Flow • Send/Receive flow and rate • Maximum send/receive rate
	Previous connection • Duration • Send/Receive flow
	Total • Duration • Send/Receive flow
Phonebook	Capacity: It is subject to the SIM/USIM card capacity or the hard disk space.
	Management: Name, phone numbers (mobile phone, home number, and office number), e-mail address, and remarks.
	Message sending from the phonebook.
	Importing/Exporting: Import/Export contacts between the SIM/USIM card and a laptop.
Other functions	Network connection settings (auto/manual network selection and registration).
	Network status display (signal, operator name, system mode and so on).
	Selection of network connection types (for example: WCDMA preferred, GPRS/EDGE preferred,).
	Selection of network frequency • All band • GSM 850 MHz/900 MHz/1800 MHz/1900 MHz • WCDMA 850 MHz/1900 MHz/2100 MHz
	PIN management: activate/deactivate PIN, PIN lock, changing PIN, unblocking PIN by using the PUK.
Note: • PIN = personal identification number • PUK = PIN unblocking key	

3 Services and Applications

3.1 SMS

The E870 features the following:

- SMS based on GSM/WCDMA CS domain.
- SMS based on GPRS/WCDMA PS domain.

On the dashboard, you can select a bearing domain for message sending: PS or CS.

The E870 supports message writing/sending/receiving/group sending. You can manage messages through the dashboard. Also, you can import/export messages between the SIM/USIM card and a laptop.

3.2 Data Service

The E870 supports the following data services:

- CS domain data service based on WCDMA/GSM
- PS domain data service based on HSDPA/WCDMA/EDGE/GPRS

You can send/receive e-mails, surf the Internet, and download files through an established wireless data channel.

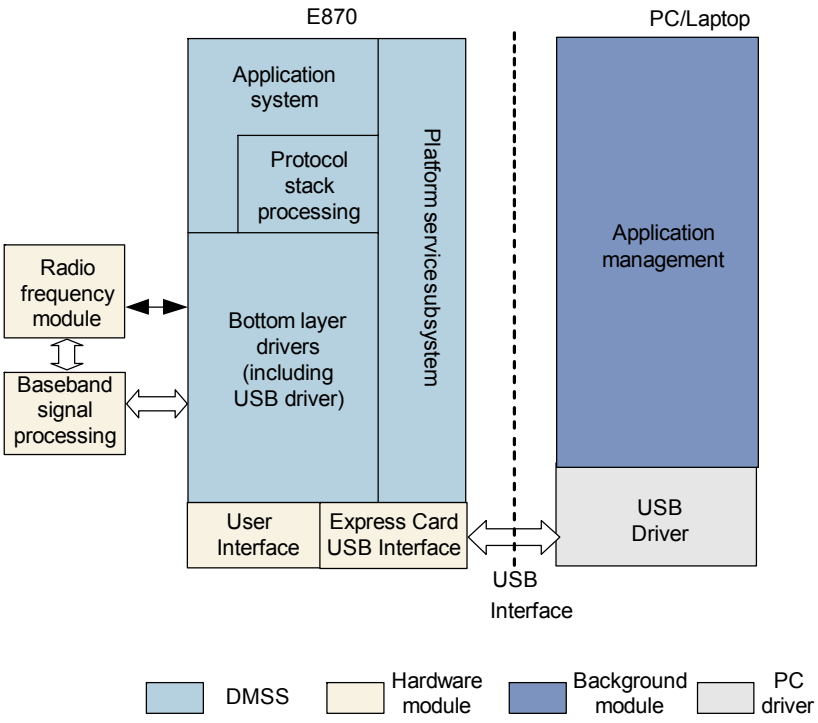
Enter ***99#** or ***98#** to launch the PS domain data service. On the dashboard, you can select a network type for the PS domain data service. The operation procedures of the CS domain data service are similar as that of the PS domain data service except the access number. Contact your service provider to get the access number.

4 System Architecture

4.1 System Architecture

Figure 4-1 shows the diagram of the system architecture.

Figure 4-1 System architecture diagram



4.2 Functional Modules

Radio Frequency (RF) Module

It sends/receives radio signals and modulates/demodulates between RF signals and baseband signals.

Baseband Signal Processing

It processes HSDPA/WCDMA/EDGE/GPRS/GSM baseband digital signals, including: Modulate/Demodulate HSDPA/WCDMA baseband, Modulate/Demodulate EDGE/GPRS/GSM baseband, Encode/Decode HSDPA/WCDMA channel, Encode/Decode EDGE/GPRS/GSM channel.

Bottom Layer Driver

It drives peripherals and implements the Plug&Play function. Peripherals include universal serial bus (USB), LED and SIM/USIM.

Platform Service Subsystem

It initializes programs, diagnoses, downloads data and serves as a watchdog.

Protocol Stack System

It processes Layer 2 and Layer 3 protocols of HSDPA/WCDMA/GSM/GPRS/EDGE.

Application System

It sends laptop commands to the bottom layer protocol for processing and returns the value to the laptop. Current application includes call management, message management, and CS/PS domain service management.

User Interface

It provides interfaces to connect peripherals. Interfaces are for LED, SIM/USIM, and external antenna.

Express Card USB

It provides the USB interface as defined in the ExpressCard Standard. USB driver function is realized on a laptop. The functions help exchange information between the dashboard and the E870.

Application Management

It realizes the message sending/receiving function on a laptop. It provides the CS/PS domain Web-browsing interface. Also, it refreshes the E870 status periodically.

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5 Packing List

Table 5-1 lists the packing list of the E870.

Table 5-1 Packing list

Item	Quantity	Remarks
HUAWEI E870 data card	1	Standard
Adapter	1	Standard
HUAWEI E870 data card quick start	1	Standard
Certificate of conformance	1	Standard

6 Technical Reference

6.1 Layer 1 Specifications (Physical)

- Examples of Channel Coding and Multiplexing TR 25.944 (V3.3.0)
- Physical Layer–General Description TS 25.201 (V3.1.0)
- Physical Channels and Mapping of Transport Channels onto Physical Channels (FDD) TS 25.211 (V3.5.0)
- Multiplexing and Channel Coding (FDD) TS 25.212 (V3.5.0)
- Spreading and Modulation (FDD) TS 25.213 (V3.4.0)
- Physical Layer–Procedures (FDD) TS 25.214 (V3.5.0)
- Physical Layer–Measurements (FDD) TS 25.215 (V3.5.0)

6.2 Layer 2 Specifications (MAC/RLC)

- MAC Protocol Specification TS 25.321 (V3.6.0)
- RLC Protocol Specification TS 25.322 (V3.5.0)

6.3 Layer 3 Specifications (RRC)

- UE Interlayer Procedures in Connected Mode TS 25.303 (V3.6.0)
- UE Procedures in Idle Mode TS 25.304 (V3.5.0)
- RRC Protocol Specification TS 25.331 (V3.5.0)

6.4 Layer 3 NAS/Core Network (MCM)

- Architectural Requirements for Release 1999 TS 23.121 (V3.5.1)
- NAS Functions Related to Mobile Station (MS) in Idle Mode TS 23.122 (V3.5.0)
- Mobile Radio Interface Signaling Layer 3–General Aspects TS 24.007 (V3.6.0)
- Mobile Radio Interface Layer 3 Specification–Core Network TS 24.008 (V3.6.0)
- PP SMS Support on Mobile Radio Interface TS24.011 (V3.5.0)

6.5 GSM Protocol Specifications

- Mobile Radio Interface Layer 3 Specification, Radio Resource Control Protocol TS 04.18 (V8.10.0)
- Mobile Station–Base Station System (MS–BSS) interface; Data Link (DL) Layer Specification TS 04.06 (V8.11.0)
- Digital Cellular Telecommunications System (Phase 2+); Multiplexing and Multiple Access on the Radio Path TS 05.02 (V8.9.0)
- Technical Specification Group GERAN; Channel coding TS 05.03 (V8.6.1)
- Digital Cellular Telecommunications System (Phase 2+); Radio Subsystem Link Control TS 05.08 (V8.a.0)
- Digital Cellular Telecommunications System (Phase 2+); Radio Subsystem Synchronization TS 05.10 (V8.8.0)

6.6 GPRS Protocol Specifications

- Overall Description of the GPRS Radio Interface; stage 2 TS 3.64 (V8.8.0)
- Mobile Radio Interface Layer 3 Specification TS 04.08 (V8.0.0)
- Mobile Radio Interface Layer 3 Specification: Radio Resource Control Protocol TS 04.18 (V8.10.0)
- General Packet Radio Service (GPRS): Mobile Station (MS)–Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol TS 04.60 (V8.10.0)
- Mobile Station – Serving GPRS Support Node (MS-SGSN) Logical Link Control (LLC) Layer Specification TS 04.64 (V8.6.0)
- Mobile Station – Serving GPRS Support Node (MS-SGSN); Subnetwork Dependent Convergence Protocol (SNDCP) TS 04.65 (V8.1.0)
- Multiplexing and Multiple Access on the Radio Path TS 05.02 (V8.9.0)
- Channel Coding TS 05.03 (V8.6.1)
- Modulation TS 05.04 (V8.3.0)
- Radio Transmission and Reception TS 05.05 (V8.10.0)
- General Packet Radio Service (GPRS); Stage 1 TS 22.060 (V3.5.0)
- Mobile Execution Environment (MexE) TS 23.057 (V3.4.0)
- General Packet Radio Service (GPRS) Service description; stage 2 TS 23.060 (V8.8.0)

6.7 General Specifications

- UE Capability Requirements TR 21.904 (V3.3.0)
- UE Radio Access Capabilities TR 25.926 (V3.2.0)
- Vocabulary TR 25.990 (V3.0.0)
- Radio Interface Protocol Architecture TS 25.301 (V3.6.0)
- Services Provided by the Physical Layer TS 25.302 (V3.7.0)
- Synchronization in UTRAN Stage 2 TS 25.402 (V3.4.0)

6.8 Performance/Test Specifications

- UE Radio Transmission and Reception (FDD) TS 25.101 (V3.5.0)
- Common Test Environments for User Equipment (UE) TS 34.108 (V3.2.0)
- Special Conformance Testing Functions TS 34.109 (V3.2.0)
- Terminal Conformance Specification TS 34.121 (V3.3.0)
- User Equipment (UE) Conformance Specification; Part 1: Protocol Conformance TS 34.123-1 (V3.2.0)
- User Equipment (UE) Conformance Specification; Part 2: Protocol Conformance TS 34.123-2 (V3.2.0)
- Terminal Conformance Specification, Radio Transmission and Reception (FDD) TS 34.121 (V3.3.0)
- S48 User Equipment (UE) Conformance Specification; Part 2: Implementation Conformance Statement (ICS) Specification TS 34.123-2 (V3.2.0)

6.9 USIM Specifications

- SIM and IC Card Requirements TS 21.111 (V3.3.0)
- 3rd Gen. Partnership Proj Tech. Spec. Group Terminals; SIM App. Toolkit (USAT) TS 31.111 (V3.3.0)

A Acronyms and Abbreviations

3GPP	3rd Generation Partnership Project
A	
AMR	Adaptive Multi-rate Codec
C	
CPU	Central Processing Unit
CS	Circuit Switched domain
CS #	Coding Scheme
D	
DCS	Digital Cellular System
DL	Downlink
E	
EDGE	Enhanced Data Rates for Global Evolution
G	
GSM	Global System for Mobile Communications
GPRS	General Packet Radio Service (System)
H	
HSDPA	High Speed Downlink Packet Access
HSPA	High Speed Packet Access

HSUPA	High Speed Uplink Packet Access

L

LED	Light-emitting Diode

M

MAC	Media Access Control
MCS #	Modulation Coding Scheme

N

NAS	Network Access Server

P

PCMCIA	Personal Computer Memory Card International Association
PCSC	Personal Computer Smart Card
PIN	Personal Identification Number
PS	Packet Switched Domain
PUK	PIN Unblocking Key

R

RAM	Random Access Memory
RLC	Radio Link Control
RRC	Radio Resource Control

S

SIM	Subscriber Identity Module
SMS	Short Messaging Service

U

UE	User Equipment
UL	Uplink
UMTS	Universal Mobile Telecommunications System
USB	Universal Serial Bus

USIM	UMTS Subscriber Identity Module

W

WCDMA	Wideband Code Division Multiple Access