Engineering Requirement Specification of T07L022.00

Prepared by	Reviewed by	Approved by
Humphrey Huang		

Contents

0. Revision History

Date	Revision	Comment
2005/01/18	0.0	Initial released

1. Introduction

Project Name: T07L022.00

This documentation describes the Engineering Requirement Specification (ERS) of the ADSL CPE with four Ethernet interfaces and a Wireless interface using BRCM BCM6348 solution.

1.1 Referenced Documents

[1] Specifications for Next-Generation xDSL Broadband Access Network, Chunghwa Telecom Co., Ltd.

2. Hardware Requirements

2.1 Overall Information

T07L022.00 for CHT 6th tender

- ☐ ADSL2+ CPE
- ☐ Four-port Ethernet
- ☐ MiniPCI interface for 802.11g WLAN

2.2 Detailed HW Information

2.2.1 Generic assumptions

- ☐ ADSL: BCM6348
- ☐ Ethernet Switch: BCM5325E
- ☐ SDRAM: 16MB - (4M*16) * 2 pcs
- ☐ Flash: 4MB
- ☐ WLAN Interface: MiniPCI
- ☐ Standalone POTS Splitter/ Low-pass Filter

2.2.2 ADSL requirements

- ☐ Standard: ITU-T G.992.5 (ADSL2+)
- ☐ ADSL physical performance requirements:

Test Loop	Disturber Type/ Noise	Net Data Rate (kbit/s)		Latency Path
		Downstream	Upstream	
5kft, 26 AWG	–140dBm/Hz AWGN	16000	1024	Interleaved
14kft, 26 AWG	–140dBm/Hz AWGN	2336	704	Interleaved
17kft, 26 AWG	–140dBm/Hz AWGN	832	448	Interleaved
CSA #4	–140dBm/Hz AWGN	8000	800	Interleaved as D= 1*1
	24 HDSL	6464	512	Interleaved as D= 1*1
	5 T1	2208	800	Interleaved as D= 1*1
	24 DSL (ISDN)	7584	736	Interleaved as D= 1*1
T1.601 #13	–140dBm/Hz AWGN	3008	704	Interleaved as D= 1*1
	24 HDSL	1312	64	Interleaved as D= 1*1
	5 T1	512	704	Interleaved as D= 1*1
	24 DSL (ISDN)	2432	288	Interleaved as D= 1*1
1.4km, Loop#1*2	G1.FD+G2.FD+G4*3	6144	640	Interleaved
3.6km, Loop#1*2	G1.FD+G2.FD+G4*3	2048	512	Interleaved

Note:
1. D is the interleaving depth of the latency path.
2. Loop #1 is specified in ETSI TS 101 388 (2002).
3. For upstream performance test, G1.FD = G1.X.LT.FD and G2.FD = G2.X.NT.FD.
   For downstream performance test, G1.FD = G1.X.NT.FD and G2.FD = G2.X.LT.FD.

2.2.3 Ethernet interface requirements

The ATU-R shall provide four 10/100 Base-T auto-sensing and half/full duplex configurable Ethernet interfaces. The Ethernet interfaces for ATU-R shall be able to operate well simultaneously. The 10/100 Base-T Ethernet interface shall comply with the IEEE 802.3/IEEE 802.3u, respectively.

2.2.4 Wireless interface requirements

☐ Transmitter:

Max. output power shall be ≧

- ✧ 15mW,
- ✧ 30mW,
- ✧ 60mW,

as an option and will be selected in procurement specification.

☐ Receiver:

In conditions at packet size=1000 bytes, PER(Packet Error Rate)≦10%.

Data rate (Mbps)	Minimum sensitivity (dBm)	Adjacent channel rejection (dB)	Alternate adjacent channel rejection (dB)
6	-82	16	32
9	-81	15	31
12	-79	13	29
18	-77	11	27
24	-74	8	24
36	-70	4	20
48	-66	0	16
54	-65	-1	15

2.2.5 LEDs

Shall provide different status indicators on the front panel.

(1) Power,

(2) Alarm,

(3) LAN Connectivity for each LAN port,

(4) LAN Data Transmit/Receive for each LAN port,

(5) Line Synchronization, including retraining phase and in-synchronization,

(6) Line interface Data Transmit/Receive,

(7) Wireless Connectivity and Data Transmit/Receive.

3. Software Requirements

Follow the requirements of [1].

4. Regulatory requirements

☐ Suitable protection devices in compliance with IEC 61000-4-5 class 3 at least or FCC part 68 shall be provided on the line interfaces, the POTS splitter/ Low-pass filter, and AC power supply lines to safeguard the unit against the damage due to transient and lightning surge voltage presented on the telephone line and AC power supply line. The test results of IEC 61000-4-5 can be temporary degradation or loss of function or performance but must be self-recoverable and pass operationally within 10 minutes. To fulfill surge protection in easy-installation manner, the ATU-R must incorporate with chassis grounding mechanism on the exterior of device.

☐ The electromagnetic compatibility requirements of the ATU-R shall comply with class A of EN55022 of the CENELEC (the European Committee for Electrotechnical Standardization), or class A of 22 of the CISPR (International Special Committee on Radio Interference of the International Electrotechnical Commission) or class A of Subpart B of Part 15 of the FCC (Federal Communications Commission) rules of U.S.A.

Engineering Requirement Specification of T07L022.01

Prepared by	Reviewed by	Approved by
Devin Shyr	Humphrey Huang	

Contents

0. Revision History

Date	Revision	Comment
2005/07/19	0.0	Initial released

1. Introduction

Project Name: T07L022.01

This documentation describes the Engineering Requirement Specification (ERS) of the ADSL CPE with four Ethernet interfaces.

1.1 Referenced Documents

[1] Specifications for Next-Generation xDSL Broadband Access Network, Chunghwa Telecom Co., Ltd.

2. Hardware Requirements

2.1 Overall Information

T07L022.01 for CHT 6th tender

- ADSL2+ CPE
- Four-port Ethernet

2.2 Detailed HW Information

2.2.1 Generic assumptions

- ADSL: BCM6348
- Ethernet Switch: BCM5325E
- SDRAM: 16MB - (4M*16) * 1 pcs
- Flash: 2MB
- Standalone POTS Splitter/ Low-pass Filter

2.2.2 ADSL requirements

- ☐ Standard: ITU-T G.992.5 (ADSL2+)
- ☐ ADSL physical performance requirements:

Test Loop	Disturber Type/ Noise	Net Data Rate (kbit/s)		Latency Path
		Downstream	Upstream	
5kft, 26 AWG	–140dBm/Hz AWGN	16000	1024	Interleaved
14kft, 26 AWG	–140dBm/Hz AWGN	2336	704	Interleaved
17kft, 26 AWG	–140dBm/Hz AWGN	832	448	Interleaved
CSA #4	–140dBm/Hz AWGN	8000	800	Interleaved as D= 1*1
	24 HDSL	6464	512	Interleaved as D= 1*1
	5 T1	2208	800	Interleaved as D= 1*1
	24 DSL (ISDN)	7584	736	Interleaved as D= 1*1
T1.601 #13	–140dBm/Hz AWGN	3008	704	Interleaved as D= 1*1
	24 HDSL	1312	64	Interleaved as D= 1*1
	5 T1	512	704	Interleaved as D= 1*1
	24 DSL (ISDN)	2432	288	Interleaved as D= 1*1
1.4km, Loop#1*2	G1.FD+G2.FD+G4*3	6144	640	Interleaved
3.6km, Loop#1*2	G1.FD+G2.FD+G4*3	2048	512	Interleaved

Note:
1. D is the interleaving depth of the latency path.
2. Loop #1 is specified in ETSI TS 101 388 (2002).
3. For upstream performance test, G1.FD = G1.X.LT.FD and G2.FD = G2.X.NT.FD.
   For downstream performance test, G1.FD = G1.X.NT.FD and G2.FD = G2.X.LT.FD.

2.2.3 Ethernet interface requirements

The ATU-R shall provide four 10/100 Base-T auto-sensing and half/full duplex configurable Ethernet interfaces. The Ethernet interfaces for ATU-R shall be able to operate well simultaneously. The 10/100 Base-T Ethernet interface shall comply with the IEEE 802.3/IEEE 802.3u, respectively.

2.2.4 LEDs

Shall provide different status indicators on the front panel.

(1) Power,
(2) Alarm,
(3) LAN Connectivity for each LAN port,
(4) LAN Data Transmit/Receive for each LAN port,
(5) Line Synchronization, including retraining phase and in-synchronization,
(6) Line interface Data Transmit/Receive,

3. Software Requirements

Follow the requirements of [1].

4. Regulatory requirements

- ☐ Suitable protection devices in compliance with IEC 61000-4-5 class 3 at least or FCC part 68 shall be provided on the line interfaces, the POTS splitter/ Low-pass filter, and AC power supply lines to safeguard the unit against the damage due to transient and lightning surge voltage presented on the telephone line and AC power supply line. The test results of IEC 61000-4-5 can be temporary degradation or loss of function or performance but must be self-recoverable and pass operationally within 10 minutes. To fulfill surge protection in easy-installation manner, the ATU-R must incorporate with chassis grounding mechanism on the exterior of device.

- ☐ The electromagnetic compatibility requirements of the ATU-R shall comply with class A of EN55022 of the CENELEC (the European Committee for Electrotechnical Standardization), or class A of 22 of the CISPR (International Special Committee on Radio Interference of the International Electrotechnical Commission) or class A of Subpart B of Part 15 of the FCC (Federal Communications Commission) rules of U.S.A.