



Suruhanjaya Komunikasi dan Multimedia Malaysia
Malaysian Communications and Multimedia Commission

GUIDELINES ON BROADBAND OVER POWER LINE COMMUNICATIONS
(MCMC/G/03/05)

26 SEPTEMBER 2005

Notice:

The information contained in this document is intended as a guide only. For this reason it should not be relied on as legal advice or regarded as a substitute for legal advice in individual cases. Parties should still refer to the legislative provisions contained in the law.

Malaysian Communications and Multimedia Commission
63000 CYBERJAYA
Selangor Darul Ehsan
Tel: +60 3-8688 8000
Fax: +60 3-8688 1000
Website: www.mcmc.gov.my

DEFINITIONS

For the purposes of the guidelines, the following definitions apply.

- BPL (Broadband over Power Line)** : A carrier current system installed and operated on an electric power lines as an unintentional radiator that sends radio frequency energy on frequencies between 1.705 MHz and 80 MHz over medium voltage lines or over low voltage lines to provide broadband communications and is located on the supply side of the electricity service provider's points of interconnection with customer premises. This is also commonly known as Access BPL.
- Broadband** : A wide band frequencies used to transmit information in which the information can be multiplexed and sent on many different frequencies or channels within the band concurrently, allowing more information to be transmitted in a given amount of time.
- Class B equipment** : A category of apparatus which satisfies the class B ITE disturbance limits. Class B is intended primarily for use in the domestic environment and may include:
- Equipment with no fixed place of use; for example, portable equipment powered by built-in batteries;
 - Telecommunication terminal equipment powered by a telecommunication network;
 - Personal computers and auxiliary connected equipment.
- Customer** : Customer (End User, Subscriber) is a common legal term meaning an individual, firm, partnership, corporation, or organization.
- Customer Premises Equipment** : An Equipment employed on the premises of a customer, which can originate, route or terminate telecommunications, is customer premises equipment
- dB** : A unit of measurement which expresses changes in signal power levels or signal attenuation along a logarithmic scale. $dB=10$ times the log of the ratio of the power of the two signals. This is equal to 20 times the ratio of their voltages, if the signals are driving equal impedances.

- dBm : A unit that defines a signal level by comparing it to a reference level. The reference level of 0dBm is defined as 1mW. The signal level in dBm is 10 times the log of the signal's power over that of the 0 dBm reference.
- Harmful Interference : Interference which endangers or seriously degrades, obstructs or repeatedly interrupts the functioning of one or more safety services or the operation of any apparatus in accordance with these regulations.
- In-Building BPL (In-Building Broadband over Power Line) : A carrier current system, operating as an unintentional radiator, that sends radio frequency energy by conduction over electric power lines that are not owned, operated or controlled by an electric service provider. The electric power lines may be aerial (overhead), underground, or inside the walls, floors or ceilings of user premises. In-Building BPL devices may establish closed networks within an end user's premises or provide connections to Access BPL networks, or both.
- Layer 2 : Layer 2 refers to the Data Link Layer of the commonly referenced multi-layered communication model, Open Systems Interconnection (OSI). The Data Link layer is concerned with moving data across the physical links in the network. In a network, the switch is a device that redirects data messages at the layer 2 level, using the destination Media Access Control (MAC) address to determine where to direct the message.
- Mbps : Mbps stands for *millions of bits per second* or *megabits per second* and is a measure of bandwidth (the total information flow over a given time) on a telecommunications medium.
- MHz : MHz stands for the number of oscillations of electromagnetic radiation per second.
- PLC Forum : A leading international Association that represents the interests of manufacturers, energy utilities and other organisations in the field of access and in-home BPL/PLC technologies.

- Power line : An electric wire or cable or infrastructure that conducts and brings electricity supply to homes and businesses.
- RJ-11 : Registered Jack - Type 11 is a physical interface often used for terminating twisted pair type cables. It has six pins or electrical connections.
- RJ-45 : Registered Jack - Type 45 is a physical interface often used for terminating twisted pair type cables. It has eight "pins" or electrical connections.
- Regulatory Bodies : The Ministry, State or Local Authority or any other Government Agencies who regulates the implementation standards and guidelines of the multimedia and communication, and energy related services in Malaysia.

**MALAYSIAN COMMUNICATIONS AND MULTIMEDIA COMMISSION
GUIDELINES ON BROADBAND OVER POWER LINE (BPL)
COMMUNICATIONS**

TABLE OF CONTENT

PREFACE	7
1.0 OBJECTIVES	8
1.1 Scope of the Guidelines	8
2.0 INTRODUCTION	9
3.0 BPL SYSTEM COMPLIANCE	12
3.1 NIB (Non-Interference Basis)	12
3.2 Network Protocols	12
3.3 Operating Frequency	12
3.4 Operating Power	13
3.5 System Compatibility	13
3.6 Compliance with MCMC and EC Requirements	13
4.0 GENERAL REQUIREMENT FOR OPERATIONAL OF BPL PHYSICAL NETWORK LAYER	16
4.1 Network Overview	16
4.1.1 Electricity Distribution Network	16
4.1.2 Backhaul Data Network	17
4.1.3 BPL Network	17
4.2 BPL Physical Network Layer Components	17
4.2.1 Medium/Low Voltage Node (MV/LV -Node)	18
4.2.2 Transformer Node (X-Node)	18
4.2.3 Repeater Node (R-Node)	19
4.2.4 Customer Premises Equipment (CPE)	19
4.2.5 Couplers	19
4.2.6 Line Conditioning Devices	20
5.0 GUIDELINES AND REQUIREMENTS FOR DEPLOYMENT OF BPL PHYSICAL NETWORK LAYER	21
5.1 Scope	21

5.2	Electromagnetic Compatibility and Interference Requirements	21
5.2.1	General	21
5.2.2	EMC Requirements for BPL Equipment	21
5.2.3	EMI Requirement for BPL Installation	22
5.3	Security Requirement.....	22
5.3.1	General	22
5.3.2	Security Requirements for Electricity Distribution System and Services	23
5.3.3	Security Requirement for BPL System.....	24
5.4	Safety Requirements during Installation, Operation and Maintenance	24
5.4.1	General	24
5.4.2	BPL Equipment Requirements.....	25
5.4.3	BPL Accessories Requirements	25
5.4.4	Safety Guidelines on BPL Works	26
5.5	Quality of Service Requirements	26
5.6	Regulatory Requirements	27
6.0	REFERENCE DOCUMENTS.....	28
7.0	LICENSING REQUIREMENT.....	29

PREFACE

These guidelines have been developed in collaboration with the Malaysian Technical Standard Forum Berhad (MTSFB). These guidelines are intended as a reference to establish clear understanding of the general requirement to facilitate potential Broadband over Power Line (BPL) service providers in rolling out their services. Compliance with these guidelines do not of itself confer immunity from legal obligations.

The MTSFB members that worked in developing the contents of these guidelines are comprised representatives from telecommunication service providers, government-related bodies, manufacturers, system developers and integrators, and higher learning institution;

- Celcom (Malaysia) Berhad
- Corinex Global
- Energy Commission
- Masers Digital Sdn Bhd
- Maxis Communications Bhd
- Realm Energy Sdn Bhd
- SIRIM Berhad
- Tenaga Nasional Berhad
- Time dotCom Berhad
- TMNet Sdn Bhd
- TM Research & Development Sdn Bhd
- Universiti Putra Malaysia

These guidelines should be read together with the CMA, the relevant subsidiary legislations, instruments, codes and guidelines that have been issued by the MCMC pursuant to the CMA.

1.0 OBJECTIVES

The objective of these guidelines are to provide a guided approach for the introduction of Broadband over Power Line (BPL) communications service by licensed service providers. It is intended to facilitate parties interested to understand the procedure of provisioning this service in Malaysia. BPL is also referred to as Power Line Communication (PLC), Digital Power Line (DPL) and Power Line Transmission (PLT). These guidelines also outline possible technical configurations of the equipment with regard to the technical capabilities.

1.1 Scope of the Guidelines

These guidelines cover the following areas;

- 1.1.1 BPL system compliance, allowable operating frequency, permissible operating power and equipment standards;
- 1.1.2 General requirement for the operational of BPL physical network layer applicable to Malaysia;
- 1.1.3 General requirement for the deployment of BPL physical network layer applicable to Malaysia;
- 1.1.4 Licensing.

2.0 INTRODUCTION

- 2.1** Broadband over Power Line (BPL) is a term used to identify technologies, equipment, applications and services intended at providing end users with communications means over existing power lines. BPL is also referred to the transmission of high-speed data over the electricity power line to provide communications service such as voice, video and data.
- 2.2** The concept of transmitting signals over power lines has been around for many years and has been used by power companies to transmit data signals at low frequencies and low speed. In the year 2005, a new generation chipset at 200 Mbps was made commercially available offering enhanced performance of this technology. This development has made it possible for data to be transmitted at a much high speed.
- 2.3** With the advancements in telecommunications technology such as BPL, the MCMC recognises the potential benefits that affect not only businesses and corporate structures, but also to the individual user of this technology as well. BPL is already in used in other countries and the MCMC is of the opinion that BPL has the potential of providing affordable broadband access to homes and businesses, and also brings broadband connectivity to the underserved rural communities. The lack of alternative telecommunications infrastructure has been a hindrance to broadband penetration in this country and BPL is a potential alternative for rapid low cost access solution to bridge the digital divide.
- 2.4** In formulating a policy position toward BPL, the MCMC had carried out a consultation process with the industry to give the industry an opportunity to personally address the MCMC on this subject. Through our public consultation exercise the MCMC received a range of responses regarding the roll-out of BPL in this country and the concerns that the MCMC need to take into consideration when allowing BPL to be deployed in Malaysia.

- 2.5** At this point in time, BPL can only be deployed in limited scenarios. The present law governing electricity needs to be amended before a wide scale BPL deployment is allowed. Until such amendment, if any, takes place, the Energy Commission (EC) may only exercise its discretion in allowing limited and conditional application of BPL.
- 2.6** BPL may be deployed in the circumstances outlined below. This is possible for the reason that the infrastructure (i.e., electrical network) in the scenarios below is beyond the electric meter is not the property of the power company i.e., it is beyond the power company's jurisdiction and is considered as customer's equipment. For Internet connectivity, the BPL operator will need to establish a link (via wired or wireless connection) to the said premises at the building's substation or main distribution board.
- a. **In-House¹/Residence PLC application**
BPL is only used in the home environment. There is no licensing requirement as the device is on the customer side of the boundary.
 - b. **Private network facilities and /or service**
BPL is installed on the infrastructure of a corporation/business entity for its own consumption. This will be in the Exempt category whereby the implementation is unlikely to go beyond a single site.
 - c. **Limited deployment scenario**
BPL is deployed for specific and limited purposes and that the electrical infrastructure within the said area is privately owned. This set-up falls within the Class-Niche classification.

¹ In-House PLC provides broadband interconnection between devices within users' premises by transmitting via the interior electrical wiring of the building. It is designed for short-distance communication solutions typically less than 100 meters and the power levels are relatively low.

- 2.7** It should be noted that a prior written approval should be obtained from the MCMC and EC before deploying the BPL system. Consent must also be obtained from the electricity provider whose power lines are to be used. Prospective BPL providers should also ensure that the equipment is certified by MCMC's designated certification agency, SIRIM.

3.0 BPL SYSTEM COMPLIANCE

The operation of BPL system in Malaysia should be subjected to the following conditions;

3.1 NIB (Non-Interference Basis)

BPL operations shall not cause harmful interference to any radio transmission in any spectrum bands. The MCMC may conduct testing to ascertain compliance to the radio emission standards before putting into service. If harmful interference occurs, the transmission should not resume until after investigation have been concluded, and measures taken to resolve the interference have been taken.

3.2 Network Protocols

The BPL system should be a Layer 2 network and transparent for IP communications. The BPL system should also support duplex, broadcast and multicast communications in an efficient way.

3.3 Operating Frequency

The BPL system installed in MV and LV distribution system should operate within the frequency band from 1 MHz to 40 MHz.

The operating frequency used should not cause any interference to other licensees' frequency or frequencies, or reserved frequencies used by the Government of Malaysia's authorities, enforcement agencies and military, or the frequencies used by the neighbouring countries.

Other frequency bands beyond 40 MHz may be considered subject to further development of the technology and the deployment scenarios.

3.4 Operating Power

The BPL system installed in MV and LV distribution system should have the capability to limit the output power to -50 dBm/Hz or below, and the aggregated output power to not higher than 13 dBm.

3.5 System Compatibility

The BPL system should be compatible to operate in the Malaysian's electricity distribution environment physically and technically without any modifications or alteration needed to the electricity distribution systems and components.

For operational compatibility, the BPL system should comply with the Electromagnetic Compatibility/Immunity (EMC/EMI) regulations, specifications and recommendations as outlined in Section 5.2.

All BPL system installed in the MV and LV distribution system must have the following features which will enhance the service performance and reliability, and also to inhibit possible interferences to other frequencies users;

- a. Frequency notching
- b. Frequency band blocking
- c. Power adjustment

3.6 Compliance with MCMC and EC Requirements

- a. **Type Approval** - All BPL devices (as regulated by MCMC and EC) should be certified by SIRIM and Type Approved for deployment in Malaysia.
- b. **Type Test** - BPL devices should be tested by SIRIM or Test Laboratories accredited by Accreditation Bodies who are signatories of APLAC/ILAC MRA? . The test report issued should be accompanied with test certificate.

No.	Equipment	Standard Codes	Remarks
1.0	<ul style="list-style-type: none"> • MV/LV Node • X-Node • R-Node 	<p>MS IEC 60950</p> <p>MS IEC 61000-3-2</p> <p>MS IEC 61000-3-3</p> <p>MS CISPR 22</p> <p>MS CISPR 24</p> <p>IEC 664 & CE 0682</p>	<p>Safety of Information Technology Equipment.</p> <p>Refer to Sections 4.2.1-4.2.3</p> <p>Refer to Sections 4.2.1-4.2.3</p> <p>Refer to Sections 4.2.1-4.2.3</p> <p>Refer to Sections 4.2.1-4.2.3</p> <p>Compliance standards for Over voltage protection.</p>
2.0	CPE	<p>MS IEC 60950</p> <p>MS IEC 61000-3-2</p> <p>MS IEC 61000-3-3</p> <p>MS CISPR 22</p> <p>MS CISPR 24</p> <p>IEC 664 & CE 0682</p>	<p>Safety of Information Technology Equipment.</p> <p>Refer to Section 5.2.4</p> <p>Refer to Section 5.2.4</p> <p>Refer to Section 5.2.4</p> <p>Refer to Section 5.2.4</p> <p>Compliance standards for Over voltage protection.</p>
3.0	Coupler	<p>IEC 60358</p> <p>IEC 60481</p> <p>IEC 61334-3-22</p> <p>IEC 60664-1</p> <p>IEC 60185</p> <p>IEC 60186</p> <p>IEC 664 & CE 0682</p>	<p>Coupling Capacitors and Capacitors Dividers.</p> <p>Coupling Devices for Power Line Carrier Systems.</p> <p>MV Phase-to-Earth and Screen-to-Earth Coupling Devices.</p> <p>Insulation Coordination for Equipment Within Low-Voltage Systems.</p> <p>Current Transformer.</p> <p>Voltage Transformer.</p> <p>Standards for Over voltage protection.</p>
4.0	Line Conditioning	<p>IEC 60358</p> <p>MS IEC 61000-3-2</p> <p>MS IEC 61000-3-3</p> <p>MS CISPR 22</p> <p>MS CISPR 24</p> <p>IEC 664 & CE 0682</p>	<p>Coupling Capacitors and Capacitors Dividers.</p> <p>Refer to Section 4.2.6</p> <p>Refer to Section 4.2.6</p> <p>Refer to Section 4.2.6</p> <p>Refer to Section 4.2.6</p> <p>Standards for Over voltage protection.</p>

- c. **Field Test** - In accordance to the Malaysian environment, additional tests should be conducted in field to ensure the reliability and safety of the system. The Field Test results should satisfy the EMC/EMI (Section 5.2) and Safety (Section 5.4) requirements.

4.0 GENERAL REQUIREMENT FOR OPERATIONAL OF BPL PHYSICAL NETWORK LAYER

4.1 Network Overview

The system architecture should consist of the backhaul data network that connects the BPL network to the telecommunications network, and the BPL network which overlays the electricity distribution network.

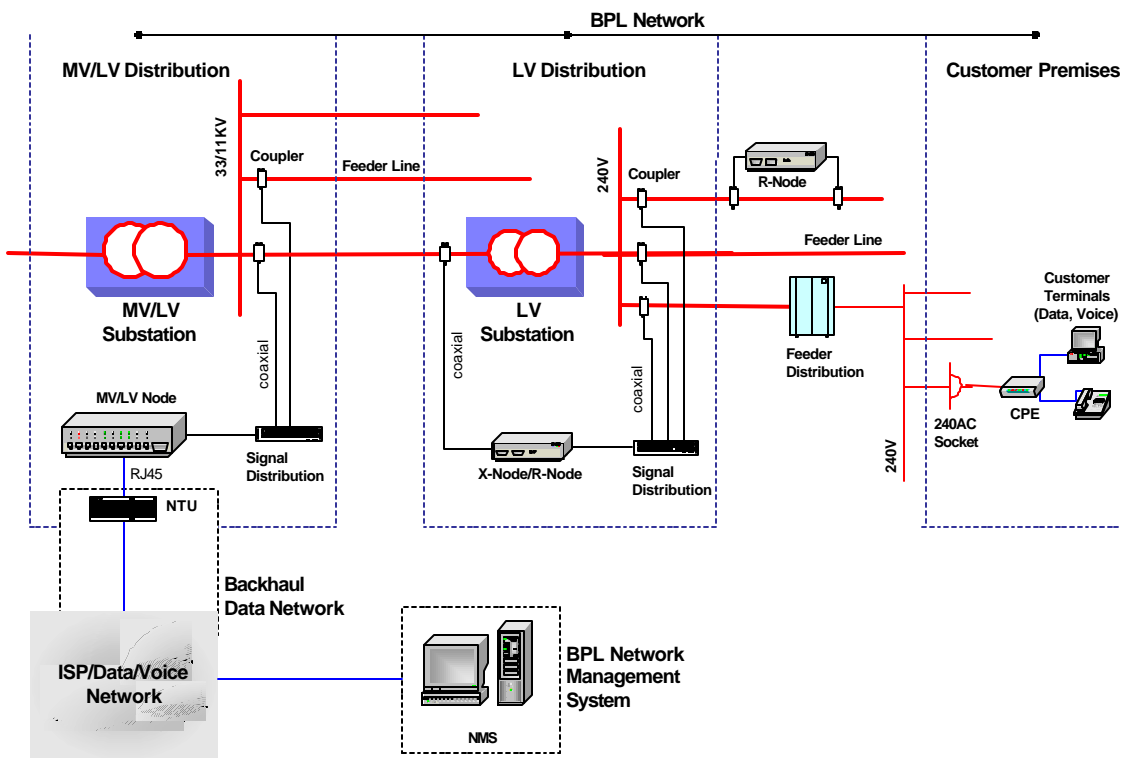


Figure 1: BPL Network Overview

4.1.1 Electricity Distribution Network

Electric power lines constitute the physical layer or transport mechanism for the BPL network.

In Malaysia, the electricity distribution systems licensed providers are;

- Tenaga Nasional Berhad (TNB) – electricity provider for West Malaysia.
- Sarawak Electricity Supply Corp (SESCO) – electricity provider for Sarawak (East Malaysia).
- Sabah Electricity Sdn Bhd (SESB) - electricity provider for Sabah (East Malaysia) and Federal Territory of Labuan.

The governing body or authority that regulates the provisioning of electricity supply in Malaysia is the Energy Commission (EC), which is under the Ministry of Energy, Water and Communications.

4.1.2 Backhaul Data Network

The backhaul data network is the telecommunications backbone to which the BPL-empowered distribution system is connected via high-speed data link.

4.1.3 BPL Network

- a. The BPL network is integrated with the electricity distribution system and is utilizing the electric power lines for broadband access communications.
- b. The BPL system should have Network Management System (NMS) as parts of the network.
- c. The BPL system should only be deployed on the MV and LV distribution systems.

4.2 BPL Physical Network Layer Components

A number of electronic devices (or nodes) are deployed at various points in the electricity distribution network to overlay a communications network on the electric power lines. These devices are characterized as

"Physical Network Layer components" and are designed to accomplish specific tasks along the BPL network. The list of nodes includes:

4.2.1 Medium/Low Voltage Node (MV/LV-Node)

The Medium/Low Voltage Node (MV/LV-Node) is a device that converts the normal IP-based communication signal to other signal appropriate for transmission over the electric power lines. It should be capable to support a variety of interfaces and functions, such as;

- a. Backhaul connections to the telecommunications backbone.
- b. BPL signals aggregation for transmission over the MV/LV feeder lines.
- c. BPL local network management that provides various functions such as sub-elements configurations, controlling and monitoring, error correction and security.

Due to safety reason, the MV/LV-Node interface to the electric power lines should not be designed to directly connect to the electric power lines, instead, a coupling device either inductive or capacitive should be used. The connection between the MV-Node and coupling unit is generally by means of a coaxial cable.

A standard data interface ports (RJ-45) should be made available for connection to the telecommunications backhaul equipment.

4.2.2 Transformer Node (X-Node)

The Transformer Node (X-Node) is a device, which is installed in the transformer room and can provide two functions;

- a. to transfer (i.e., by-passing the transformer) communication signals between MV and LV lines; and
- b. as a repeater along the MV lines.

4.2.3 Repeater Node (R-Node)

The Repeater Node (R-Node) is a device, which is installed along the electric power lines (external or internal types) and is used to provide greater reach on long lines or lines with high attenuation so that the end-to-end communication quality is maintained. In some cases the R-Node is a modified X-Node.

4.2.4 Customer Premises Equipment (CPE)

The Customer Premises Equipment (CPE) contains a BPL interface to the LV line, terminates and converts the BPL signal back to the normal IP based.

The CPE should be modular in construction to allow a variety of other interfaces for in-home services. These will include support for an in-home data network and for telephony services with standard (RJ-11) analogue telephone ports.

4.2.5 Couplers

Couplers provide the means to transmit on and receive the communication signals from the electric power line. There are two methods for coupling the signal to the power line - capacitive and inductive coupling.

- a. Capacitive coupler – The usage of capacitive coupler for the overhead MV and LV lines is preferred. For indoor applications, one should be mindful that the installation takes into consideration the issues related to the Malaysian electrical environment.

- b. Inductive coupler – This is a passive-type coupler that can be installed without interrupting the supply across the electric power lines. It should operate in overhead, pad mounted and underground scenarios and is capable of withstanding high voltage level, weather elements, external elements and surges due to lightning and switching.

4.2.6 Line Conditioning Devices

Line conditioning devices are placed on both the MV and LV distribution lines and are responsible for the sectionalizing of the electricity distribution network.

In all cases these devices should be designed to be active in the communications frequency band and not in the electricity frequency band. The functionality of the devices is to pass or block the signal as appropriate.

5.0 GUIDELINES AND REQUIREMENTS FOR DEPLOYMENT OF BPL PHYSICAL NETWORK LAYER

5.1 Scope

The deployment of BPL on the MV and LV electricity distribution network in Malaysia should follow the minimum guidelines and requirements, set forth below;

5.2 Electromagnetic Compatibility and Interference Requirements

5.2.1 General

The BPL equipments should have features to perform efficiently under the electrical environment and they should be Electromagnetic Compatible (EMC) to work with surrounding equipment and immune to the Electromagnetic Interferences/Radiations (EMI).

5.2.2 EMC Requirements for BPL Equipment

- a. BPL equipment should comply with MS CISPR 22 (emission) – and operate within the MS CISPR 22 limits for the conducted common mode voltage/current when measured at the multi purpose port for BPL (class B equipment) , specified as follows:

i) Conducted Emissions

Frequency (MHz)	dB μ V-quasi peak	dB μ A-quasi peak
-----------------	-----------------------	-----------------------

0.15 - 30	74	30
-----------	----	----

ii) Radiated Emissions (10 meters)

Frequency (MHz)	dB μ V/m
-----------------	--------------

30 - 230	30
----------	----

230 - 1000	37
------------	----

- b. BPL equipment should comply with MS IEC 61000-3-2: Limits - Limits for harmonic current emissions (equipment input current \leq 16 A per phase).
- c. BPL equipment should comply with MS IEC 61000-3-3: Limits- Limitation of voltage changes , voltage fluctuations and flicker in Public Low-Voltage supply systems, for equipment with rated current \leq 16 A per phase and not subject to conditional connection.
- d. BPL equipment should comply with the MS CISPR 24: (ITE product- immunity characteristics- limits and methods of measurements).

5.2.3 EMI Requirement for BPL Installation

- a. The radiated emission limits for BPL installation should follow the Federal Communications Commission (FCC) Part 15 § 15.209 using a QP detector, specified as follows:

Frequency	Bandwidth	Radiated emission limits
1 to 30 MHz	9 kHz	30 μ V/m (29.59 dB μ V/m) at 30 meters
30 to 88 MHz	120 kHz	100 μ V/m (40 dB μ V/m) at 3 meters

- b. The radiated emission should be measured as recommended in FCC Part 15, 15.31, 15.33 & 15.35.

5.3 Security Requirement

5.3.1 General

Security of the BPL system should be mandatory to ensure reliability of the BPL system itself and the existing electricity services quality. Due to

the criticalness of electricity services and to abide the national regulations on the electrical energy quality of service, priority of service should be given to electricity in any case.

For deployment of BPL system, two security measures should be adopted;

- a. Security to the electricity distribution system and services.
- b. Security to the BPL system.

5.3.2 Security Requirements for Electricity Distribution System and Services

- a. All BPL system devices, active and passive components should be certified by SIRIM and the deployment should be as per the EC and MCMC guidelines.
- b. Only competent personnel with valid qualifications are allowed to conduct or supervise BPL implementation, maintenance and operational activities.
- c. All BPL system devices, active and passive components should be tested after complete installation according to the approved test requirements and the test results should meet the required performance and standards.
- d. The BPL system should be designed and implemented in segments for purpose of easy operation and maintenance, and minimize disturbances to the electricity distribution elements in case of upgrading or decommission of the system.
- e. A NMS should be incorporated into the BPL Network for easy operation and management of the network elements.

- f. The BPL system users should not have access or capable to gain access to any electricity distribution network elements or systems, physically or virtually.
- g. Access or connection to the BPL network should be strictly via CPE and home UK-type 240 AC socket outlet (MS 589: Pt 1 :1997 approved plug). There should be no unauthorized or illegal tapping or other physical modifications to the electric power lines in order to gain access or connectivity to the BPL network.

5.3.3 Security Requirement for BPL System

- a. The CPE is allowed to gain access into any BPL network with proper login and authentication procedures.
- b. Service activation, deactivation, installation and operating software upgrade of customer CPEs should be make available through ISP's NMS or BPL's NMS.
- c. By default, a customer CPE is not allowed to communicate directly with another one in the same BPL network.
- d. No customer CPE should be able to receive unicast traffic addressed to another customer's CPE in the same BPL network.
- e. It should be possible to activate encryption. A "by default" activation should be possible.

5.4 Safety Requirements during Installation, Operation and Maintenance

5.4.1 General

The Safety of personnel and equipment involved during the installation, operation and maintenance of the BPL system should be highly

considered since the BPL working environment involves the electricity infrastructure and it is totally different from the normal telecommunication infrastructure.

5.4.2 BPL Equipment Requirements

- a. The BPL equipment should comply with the MCMC and EC requirements as outlined in Section 3.7.
- b. All BPL equipment should comply with the EMC/EMI Requirements as outlined in Section 5.2.

5.4.3 BPL Accessories Requirements

- a. The BPL accessories should comply with the MCMC and EC requirements as outlined in Section 3.7.
- b. All BPL accessories should comply with the EMC/EMI Requirements as outlined in Section 5.2.
- c. All BPL accessories should adhere to the Malaysian Electricity Regulations 1994.
- d. All BPL accessories should be certified to not caused or be harmed within its installed environment;
- e. Any BPL accessories for the purpose of connection to an electrical installation should be sufficient in size, power and number to serve the purpose for which it is intended and should be constructed, installed, arranged, protected, worked and maintained in such a manner as to prevent danger.
- f. No BPL accessories except those designed to be connected to an electrical socket outlet by means of a plug, should be connected to

an installation unless the connection is carried out by or under the control of a competent person.

5.4.4 Safety Guidelines on BPL Works

5.4.4.1 Public Installation

- a. No BPL works should be conducted on any public installation without first obtaining the approval in writing from a licensed provider or supply authority.
- b. Any BPL works conducted within any public installation should adhere to the Malaysian Electricity Regulations 1994, where relevant and licensed provider's or supply authority's Standards of Practice.

5.4.4.2 Private Installation

- a. No BPL works should be conducted on any private installation without first obtaining the approval in writing from the owner.
- b. Any BPL works conducted within a private installation should adhere to the Malaysian Electricity Regulations 1994, where relevant, and owner's Standards of Practice.

5.5 Quality of Service Requirements

The MCMC's quality of service (QoS) standard is created to ensure that consumers are given satisfactory level of services that meet minimum and acceptable standards, as well as to protect and enhance the rights of consumers in obtaining quality services. Providers of BPL services are to ensure QoS once the MCMC establishes the guidelines and requirements for BPL during normal electricity operating condition.

5.6 Regulatory Requirements

Any provision of BPL services using the electricity distribution network should fall within the domain of;

- a. The Malaysian Communications and Multimedia Act 1998.
- b. The Malaysian Communications and Multimedia (Technical Standards) Regulations 2000
- c. The Malaysian Electricity Supply Act 1990.
- d. The Malaysian Electricity Distribution Code 1999.
- e. The Malaysian Electricity Regulations 1994.
- f. The Malaysian Energy Commission Act 2001.

6.0 REFERENCE DOCUMENTS

The following reference documents contain provisions, which, through reference in this text, constitute provision of these guidelines.

For dated references, where there are subsequent amendments to, or revisions of, modifications, variations or revocation of any of these publications of the Technical Standard should be amended or revised accordingly.

For undated references, the latest edition of the publication referred applies.

These guidelines are based on the following references:

- a. The Malaysian Communications and Multimedia Act 1998.
- b. The Malaysian Communications and Multimedia (Technical Standards) Regulations 2000
- c. The Malaysian Electricity Supply Act 1990.
- d. The Malaysian Electricity Distribution Code 1999.
- e. The Malaysian Electricity Regulations 1994.
- f. The Malaysian Energy Commission Act 2001.
- g. The Department of Standards Malaysia, Malaysia Standards 2004.
- h. The Federal Communications Commission (MD, USA), Title 47 of the Code of Federal Regulations – Part 15.

7.0 LICENSING REQUIREMENT

7.1 In general, the provision of communications activities such as via BPL technology would require a license. Section 126 of the CMA states that owner or provider of network facilities, network services or applications will require a valid license under the Act. There may be an assortment of BPL business models out there, however for the purpose of these guidelines, the typical scenarios may be as follows;

- Ownership/provision of network facilities – requires an NFP licence
- Provision of network services – requires an NSP licence
- Provision of application services – requires an ASP licence

7.2 Prospective BPL operators should be mindful that the licensing requirements set out above are indicative only. The actual licensing requirement can only be ascertain by the MCMC upon assessment of the applications vis -à-vis the CMA and the relevant subsidiary legislations on a case by case basis.

7.3 Inquiries relating to licensing matters can be made to 03-8688-8000. Application for licences should be made with the completed application form and forwarded to:

Licensing Unit
Malaysian Communications and Multimedia Commission
Persiaran Multimedia,
63000 Cyberjaya,
Selangor.

GLOSSARY

μ	Micro (SI unit denoting a factor of 10 ⁻⁶ or one millionth)
A	Ampere (SI unit measuring current)
AC	Alternate Current
APLAC	Asia Pacific Laboratory Accreditation Cooperation
BNC	Bayonet Neill-Concelman type of RF connector
BPL	Broadband over Power Line
CISPR	International Special Committee on Radio Interference
CMA 1998	Communication and Multimedia Act 1998
CPE	Customer Premises Equipment
dB	Decibel
DB	Distribution Board
EC	Energy Commission, Malaysia
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EN	European Norm
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission (MD, USA)
HF	High Frequency (3-30MHz)
Hz	Hertz (SI unit measuring frequency)
IDA	Info-Communications Development Authority of Singapore
IEC	International Electrotechnical Commission
ILAC	International Laboratory Accreditation Cooperation

IP	Internet Protocol
k	Kilo (SI units denoting a factor of 10^3 or one thousand)
kV	Kilo Volt
LV	Low Voltage
m	Meter (SI unit measuring length)
M	Mega (SI units denoting a factor of 10^6 or one million)
Mbps	Megabit per second
MCB	Miniature Circuit Breakers
MCMC	Malaysian Communications and Multimedia Commission
MRA	Mutual Recognition Agreement
MS IEC	Malaysian Standard International Electrotechnical Commission (Malaysian Standard which is identical to IEC Standard of the same number)
MV	Medium Voltage
NMS	Network Management System
OPERA	Open PLC European Research Alliance
PLC	Power Line Communications
QP Detector	Quasi – Peak Detector
SESB	Sabah Electricity Sdn. Bhd.
SESCo	Sarawak Electricity Supply Corp
SIRIM	SIRIM Berhad
TNB	Tenaga Nasional Berhad
UPLC	United Power Line Council
V	Volt (SI unit measuring potential difference)