



smartwired®



CODE OF PRACTICE FOR HOME WIRING

Residential Systems Including Energy Management

2010

COPPER
Copper Development Centre • Australia Ltd

PREFACE

The objective of this Code of Practice is to describe the minimum wiring requirements necessary to support residential services, including those required for energy management. Compliance with minimum requirements as specified in this Code of Practice enable the use of symbols that indicate that the installed wiring platform is sufficient to support a minimal level of a given service.

The following residential systems are covered by this Code of Practice:

- Information & Communications
- Entertainment
- Energy Management
- Security & Safety
- Digital Home Health
- Age & Assisted Living
- Intelligent Lighting & Power

This is a technical Code of Practice and does not cover potential consumer protection against issues that may arise in the implementation of this material.

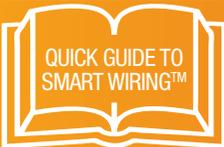
This Code of Practice is intended for:

- Architects
- Builders
- Building consultants
- Wiring contractors
- Electrical and Communications Contractors
- Electronic systems professionals
- Engineers

This is one in a series of three documents all of which are available from www.smartwiredhouse.com.au



This document sets out the building cabling platform standards to be complied with.



This document is designed for the consumer to easily communicate to the installer services they want without the need to have detailed knowledge of each technology area.



This document provides details to the installer of the cabling required to meet consumer expectations and comply with the standards

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1. SCOPE AND GENERAL

1.1 SCOPE

The objective of this Code of Practice is to describe the minimum wiring requirements necessary to support residential services, including those for energy management. Compliance with the minimum requirements specified in this Code enables the use of symbols to indicate that the wiring is sufficient to provide a minimal level of a given service. Specifications listed in this document are the **minimum requirements** – installations may be subject to other standards not shown in this document.

This document is distinct from, but is compliant with, ISO/IEC 7498-1:1994(E), which provides a common basis for the coordination of standards for the purpose of information systems interconnection.

This Code of Practice applies to all domestic residences including SDU and MDU (separate, semi-detached, row and terrace homes, flats, units and apartments).

1.2 TRADEMARKS AND SYMBOLS

Subject to an industry licensing agreement, companies that install home wiring in compliance with this Code of Practice are permitted to use the individual Smart Wired™ symbols given in this document. For details of the licensing conditions please see www.smartwiredhouse.com.au/trade.

1.3 TERMS AND DEFINITIONS

For the purpose of this document the following terms and definitions apply.

1.3.1 Appliance

A device or system that provides a service such as cooling, heating or motive power. Examples include air conditioners, water heaters, swimming pool pump units and electric vehicles. For the purpose of demand management, embedded generators are also called appliances. This includes all elements required for normal operation and which are generally supplied or installed with the product, such as thermostats or user-operated remote controls.

1.3.2 Demand response

The automated alteration of an appliance's normal mode of operation in response to an initiating signal originating from or defined remotely of the residence – usually by an electrical utility. The user may be able to choose whether to take part in a demand response program and may participate in activating, configuring or deactivating demand response capability.

1.3.3 Gateway

A system or device (computer, router) designed to provide interfacing between networks that use different protocols. Gateways provide system interoperability by operating as protocol converters between any layer of the OSI model – they are used for impedance matching and as rate converters, fault isolators, and signal translators.

1.3.4 Home Area Network (HAN)

A home network or home area network (HAN) is a residential local area network (LAN). It is used for communication between digital devices deployed in the home including personal computers, printers, mobile computing devices, security and safety systems and smart appliances.

1.3.5 Home Cinema

Home entertainment arrangements designed to reproduce a commercial movie theatre experience and mood with video and audio equipment.

1.3.6 Human Interface Device (HID)

The term “HID” most commonly refers to the USB-HID specification. The HID protocol is comprised of a “host” and a “device”. The device directly interacts with a person, such as a keyboard, mouse or touch screen display. The host communicates with the device and receives input data from the device on actions performed by a person. Output data flows from the host to the device and then to the person. Examples of a host are computers, mobile phones and personal digital assistants.

1.3.7 Local Area Network (LAN)

A local area network (LAN) is a computer network within a small geographic area such as a home or commercial building.

1.3.8 Media Centre

A Media Centre is typically a dedicated computer used to store all media content, photos, music and videos that is interconnected to other computers, audio and video systems through the network so everyone can share the content.

1.3.9 Power Line Carrier (PLC)

Power Line Carrier (PLC), also known as Power Line Digital Subscriber Line (PDSL), mains communication, Power Line Telecom (PLT), Power Line Networking (PLN), or Broadband over Power Lines (BPL) are systems for carrying data on a power cable.

1.3.10 Technology

The devices and components that comprise the platform. Includes controllable (Intelligent/Smart) appliances.

1.3.11 Server

A computer system that provides essential services across a network. Typically servers provide web, print and database functionality. They include: media centre servers; home servers; power servers that are network servers with sufficient capacity to handle the high data rates required for multimedia applications and they are able to handle multiple video streaming signals simultaneously; and, head-end servers for TV distribution of multiple sources e.g. FTA, PAY-TV, DVDS etc (all the equipment such as DVD players demodulators, modulators are considered the head end).

1.3.12 Smart/Intelligent Appliance

An appliance with an inbuilt and openly accessible capacity for remote control of its electrical energy use and functionality.

1.3.13 Smart/Intelligent Grid

An electrical network with integrated communications and electrical energy delivery systems.

1.3.14 Smart Meter

An electrical power meter able to record and remotely report energy consumption over discrete periods. Smart meters also enable other functions such as the remote control of supply into the home. Some have the capability to display energy use within the home. A Smart Meter should not be confused with a time-of-use-meter (ToU) Meter, which is able to record energy use over discreet periods (15 or 30 minutes) and is used to charge consumers different tariffs at different times of the day but has no further function.

1.3.15 User

A person, organisation or entity who directly benefits from the service provided by an appliance, who normally regulates the operation of that appliance and who is able to enter into agreements for the provision of services.

1.3.16 Wide Area Network (WAN)

A wide area network (WAN) is a communications network across large areas such as campuses, cities, regions, nations or many nations.

2 FRAMEWORK

2.1 GENERAL

This section describes a framework that enables systems professionals and customers to place into context the relationship between the platforms and the systems that are required to provide key residential services. Whilst the wiring platform is the focus of this code, this framework covers all common technologies and systems available to the residential home.

The Services covered by this Code of Practice are:

- Information & Communications
- Entertainment
- Energy Management
- Security & Safety
- Digital Home Health
- Age & Assisted Living
- Intelligent Lighting & Power

Examples of Capabilities and Functionalities that enable those systems are:

- Integrated home control
- Load control
- Display of energy use and price
- Playing movies
- Seeking medical services
- Back to base security
- Using web services – e.g. banking
- Making telephone calls
- Others

Examples of Platforms and Systems that support those Capabilities and Functionalities are:

- LAN, WAN
- Wired
- Wireless
- Power line carrier (PLC)
- Fibre in home
- Others

Examples of Technologies that support the Platforms are:

- Human interface devices (HID)
- Servers: power, media centre, head-end, or home server
- Internet gateway
- Smart appliances
- Communications: e.g. telephone.

The hierarchical nature of the systems that provision an Energy Management Service is illustrated in Figure 1. It is the intention of this Code of Practice to list a minimal set of standards and handbooks that are required to design and implement a wiring system to provision service.

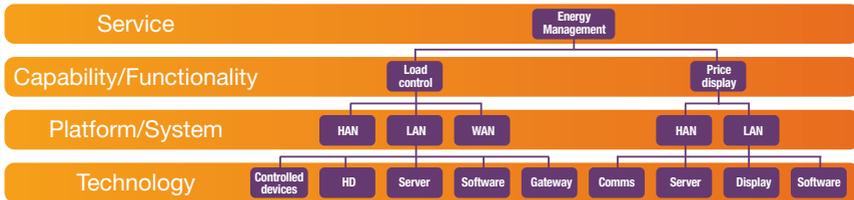


Figure 1. Example of some of the systems that support an Energy Management service.

The central role of the Smart Wired™ program in the provision of services is indicated in the diagram below. Details of each symbol are given in the following sections. **It is important to recognise that the use of these symbols does not preclude the use of wireless or power line carrier technology, which may be used to augment the wired infrastructure.** The use of the symbols indicates the presence of a minimum level of infrastructure that has been provisioned in accordance with the Code of Practice that will allow a minimum level of a given service to be delivered.

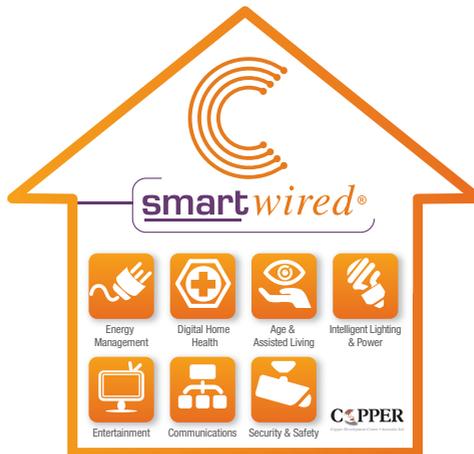


Figure 2. The central role of the Smart Wired™ program to the provision of services is illustrated in this diagram. The meaning of each symbol and terms of use are described in this document.

2.2 SERVICE SYMBOLS

The presence of a symbol indicates:

- a minimal level of wiring is provided to carry that service capability
- the wiring complies with specific requirements.

Service Designation	Service	Capability and Function
S1	 Information & Communications	<ul style="list-style-type: none"> • Computing • Home video conferencing • Intercoms • Telephony
S2	 Entertainment	<ul style="list-style-type: none"> • Distributed audio and video • Free to air TV and High definition (HDTV) content • Home theatre • Pay TV
S3	 Energy Management	<ul style="list-style-type: none"> • Controllable blinds, lighting & appliances • Electric vehicles • Manage energy use of key appliances (HW, AC, and pool pump)
S4	 Security & Safety	<ul style="list-style-type: none"> • Automatic access control • Electronic monitoring • Fire safety
S5	 Digital Home Health	<ul style="list-style-type: none"> • Monitoring devices • Video conferencing
S6	 Age & Assisted Living	<ul style="list-style-type: none"> • Health – online medical diagnostics, video to doctor etc • Safety – medical alert (falls etc) • Security – protection against intruders – includes panic buttons etc
S7	 Intelligent Lighting & Power	<ul style="list-style-type: none"> • Air conditioning • Cooking • Heating • Hot water • Lighting • Power

Table 1. The display of each of these symbols indicates that a minimum level of infrastructure has been provisioned for the service that symbol represents.

3 COMPLIANCE REQUIREMENTS FOR SERVICES

3.1 GENERAL

This Section lists the standards that are required to be met and handbooks to be followed for the provision of systems that are compliant with this Code of Practice for:

- Information & Communications
- Energy Management
- Digital Home Health
- Intelligent Lighting & Power
- Entertainment
- Security & Safety
- Age & Assisted Living

Specifications listed in this document are the minimum requirements; installations may be subject to other Standards not shown in this document.

3.1.1 Australian Building Code Compliance

In cases where the Australian Building Code requirements conflict with the recommendations or requirements of this Code of Practice, the Australian Building Code requirements shall be followed.

3.2 INFORMATION & COMMUNICATIONS



3.2.1 Symbol

This symbol indicates that the Information & Communications wiring platform meets or exceeds the minimum requirements of this Code of Practice.

3.2.2 Scope

The Information & Communications service is provisioned by:

Capabilities and Functions

- Computing
- Intercoms
- Home Video Conferencing
- Telephony

Platforms

- Home Area Network (HAN)
- Wiring (twisted pair)
- Local Area Network (LAN)
- Fibre

Technologies

- Ethernet
- Network devices such as printers
- Customer-premises equipment or customer-provided equipment (CPE)
- Ethernet enabled phones for VOIP
- PC

3.2.3 Compliance

The wiring required for Information & Communications systems shall be provisioned according to the following standards and handbooks.

STANDARD/HANDBOOK	
AS/ACIF S009	Installation requirements for customer cabling (Wiring Rules)
AS/NZS 3000:2007	Electrical installations (known as the Australian/ New Zealand Wiring Rules)
AS/NZS ISO/IEC 15018:2004	Information technology – Generic cabling for homes
HB252-2007	Communications cabling manual Module 3: Residential communications cabling handbook
Smart Wired™ Handbook suite	<ol style="list-style-type: none"> 1. Consumer handbook – known as “Quick Guide to Smart Wiring™” 2. Installer handbook for home wiring

Table 2. ICT standards and handbooks.

3.3 ENTERTAINMENT



3.3.1 Symbol

This symbol indicates that the Entertainment wiring platform meets or exceeds the minimum requirements of this Code of Practice.

3.3.2 Scope

The Entertainment system is provisioned by:

Capabilities and Functions

- Distributed Audio
- Free to Air TV
- High definition (HDTV) content
- On-demand movie and video content over internet
- Distributed Video
- Gaming
- Home Theatre
- Pay TV

Platforms

- IP reticulation
- RF reticulation
- Fibre
- Pay TV
- Wiring (coaxial and twisted pair)

Technologies

- DVD device
- Home Theatre
- Set top box
- Gaming
- Media Server
- TV

Future Technology

- Gaming consoles
- Media centre
- High Definition video distribution
- Storing and sharing movies

3.3.3 Compliance

The wiring required for Entertainment systems shall be provisioned according to the following standards and handbooks.

STANDARD/HANDBOOK	
AS/ACIF S009	Installation requirements for customer cabling (Wiring Rules)
AS/NZS 1367	Coaxial cable and optical fibre systems for the RF distribution of analogue and digital television and sound signals in single and multiple dwelling installations
AS/NZS 3000:2007	Electrical installations (known as the Australian/ New Zealand Wiring Rules)
AS/NZS ISO/IEC 15018:2004	Information technology – Generic cabling for homes
HB252-2007	Communications cabling manual Module 3: Residential communications cabling handbook
Smart Wired™ Handbook suite	<ol style="list-style-type: none"> 1. Consumer handbook – known as “Quick Guide to Smart Wiring™” 2. Installer handbook for home wiring

Table 3. BCT standards and handbooks.

3.4 ENERGY MANAGEMENT



3.4.1 Symbol

This symbol indicates that the Energy Management wiring platform meets the minimum requirements of this Code of Practice.

3.4.2 Scope

The Energy Management System is provisioned by:

Capabilities and Functions

- Control blinds
- Controlled appliances
- Smart grid interoperability
- Manage appliances (HW, AC, pool pump-unit, electric vehicle)
- Control lighting
- Demand response
- Demand response - AS4755 enabled
- Monitor power use

Platforms

- Demand Management capability
- Pool energy management system
- Fibre
- HAN/LAN
- Wiring (twisted pair)

Technologies

- In-home display
- Smart grids
- Solar panels, hot water
- Smart and/or controllable appliances
- Smart meters

3.4.3 Compliance

The wiring required for Energy Management systems shall be provisioned according to the following standards and handbooks.

STANDARD/HANDBOOK	
AS/ACIF S009	Installation requirements for customer cabling (Wiring Rules)
AS/NZS 3000:2007	Electrical installations (known as the Australian/ New Zealand Wiring Rules)
AS/NZS ISO/IEC 15018:2004	Information technology – Generic cabling for homes
AS4755 – 2007	Framework for demand response capabilities and supporting technologies for electrical products
AS4755.3.1-2008	Air conditioners
AS4755.3.2	Pools
AS4755.3.3	Hot water
Smart Wired™ Handbook suite	1. Consumer handbook – known as “Quick Guide to Smart Wiring™” 2. Installer handbook for home wiring

Table 4. Energy management standards and handbooks.

3.5 SECURITY & SAFETY



3.5.1 Symbol

This symbol indicates that the Security & Safety wiring platform meets or exceeds the minimum requirements of this Code of Practice.

3.5.2 Scope

The Security & Safety system is provisioned by:

Capabilities and Functions

- Automatic access control
- Fire safety
- Electronic monitoring

Platforms

- Back to base alarm system
- Interlinked smoke alarms
- Wiring (twisted pair)
- HAN/LAN
- Lighting control system
- Fibre

Technologies

- Automatic gates and doors
- Ethernet
- Motion sensors
- Security system
- Motion sensors
- Surveillance cameras
- Controllable lights
- HID
- Phone line
- Sensors: Smoke, thermal and motion
- Phone line
- Video door phone

3.5.3 Compliance

The wiring required for Security systems shall be provisioned according to the standards and handbooks given in:

STANDARD/HANDBOOK	
AS/ACIF S009	Installation requirements for customer cabling (Wiring Rules)
AS/NZS 3000:2007	Electrical installations (known as the Australian/ New Zealand Wiring Rules)
As/NZS ISO/IEC 15018:2004	Information technology – Generic cabling for homes
HB252-2007	Communications cabling manual Module 3: Residential communications cabling handbook
ISO/IEC TR 15067-4:2001	Information technology – Home Electronic System (HES) Application Model – Part 4: Security System for HES
Smart Wired™ Handbooks	<ol style="list-style-type: none"> 1. Consumer handbook – known as “Quick Guide to Smart Wiring™” 2. Installer handbook for home wiring

Table 5. Security standards and handbooks.

3.6 DIGITAL HOME HEALTH



3.6.1 Symbol

This symbol indicates that the Digital Home Health (including High-Dependency Care) wiring platform meets or exceeds the minimum requirements of this Code of Practice.

3.6.2 Scope

The Digital Home Health service is provisioned by:

Capabilities and Functions

- Monitoring devices
- Video conferencing

Platforms

- Computer
- HAN/LAN
- Wiring (twisted pair)
- Fibre

Technologies

- Camera
- PC
- Phone

3.6.3 Compliance

The wiring required for Digital Home Health shall be provisioned according to the standards and handbooks given in Table 6.

STANDARD/HANDBOOK	
AS/ACIF S009	Installation requirements for customer cabling (Wiring Rules)
AS/NZS 3000:2007	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS ISO/IEC 15018:2004	Information technology – Generic cabling for homes
HB252-2007	Communications cabling manual Module 3: Residential communications cabling handbook
Smart Wired™ Handbook suite	<ol style="list-style-type: none"> 1. Consumer handbook – known as “Quick Guide to Smart Wiring™” 2. Installer handbook for home wiring

Table 6. Health standards and handbooks.

3.7 AGE & ASSISTED LIVING



3.7.1 Symbol

This symbol indicates that the Age & Assisted Living wiring platform meets or exceeds the minimum requirements of this Code of Practice.

3.7.2 Scope

The Age & Assisted Living System is provisioned by:

Capabilities and Functions

- Health – online medical diagnostics, video cam to doctor etc
- Security – protection against intruders – panic buttons etc
- Safety – medical alert (falls etc)

Platforms

- Wiring (twisted pair)
- Fibre
- Lighting and power – lighting of railings and ramps to get to the bathroom at night etc

Technologies

- Alarms – warning devices
- PC
- Sensors (detectors)
- Camera
- Phone

3.7.3 Compliance

The wiring required for Age & Assisted Living Systems shall be provisioned according to the standards and handbooks given in Table 7.

STANDARD/HANDBOOK	
AS/ACIF S009	Installation requirements for customer cabling (Wiring Rules)
AS/NZS 3000:2007	Electrical installations (known as the Australian/ New Zealand Wiring Rules)
AS/NZS ISO/IEC 15018:2004	Information technology – Generic cabling for homes
HB252-2007	Communications cabling manual Module 3: Residential communications cabling handbook
Smart Wired™ Handbook suite	<ol style="list-style-type: none"> 1. Consumer handbook – known as “Quick Guide to Smart Wiring™” 2. Installer handbook for home wiring

Table 7. Age & Assisted Living System standards and handbooks.

3.8 INTELLIGENT LIGHTING & POWER



3.8.1 Symbol

This symbol indicates that the Intelligent Lighting & Power wiring platform meets or exceeds the minimum requirements of this Code of Practice. For the purposes of this Code of Practice, Intelligent Lighting & Power System refers to lighting and power that are controlled by an intelligent system which comprises at least one electronic processor and at least one sensor (detector).

3.8.2 Scope

The Intelligent Lighting & Power System is provisioned by:

Capabilities and Functions

- Air conditioning
- Heating
- Lighting
- Cooking
- Hot water

Platforms

- HAN, LAN
- Refrigeration
- Wiring
- Plumbing
- Water service

Technologies

- Controllable
 - Power outlets
 - Fluorescent and LED lights
 - Appliances (including smart appliances)
- Control panel
- Electronic processor
- Sensors (detectors)
- Telephony

3.8.3 Compliance

The wiring required for Intelligent Lighting & Power Systems shall be provisioned according to the standards and handbooks given in Table 8.

STANDARD/HANDBOOK	
AS/NZS 3000:2007	Electrical installations (known as the Australian/ New Zealand Wiring Rules)
AS/NZS ISO/IEC 15018:2004	Information technology – Generic cabling for homes
Smart Wired™ Handbook suite	1. Consumer handbook – known as “Quick Guide to Smart Wiring™” 2. Installer handbook for home wiring

Table 8. Intelligent Lighting & Power System standards and handbooks.



This document lays out the minimum levels of cabling for your home to meet the Smart Wiring™ standard. It prepares your house for Communications, Entertainment, Energy Management, Security, Digital Home Health, Age & Assisted Living and Intelligent Lighting & Power. If you want to go beyond the minimum you can find an Accredited Smart Wired™ Designer by going to www.smartwiredhouse.com.au.

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