NOKIA

WPON solution

HOU Product Guide

<< doc part number tbd >>

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1 Preface

This preface provides general information about the documentation for the Home Outside Unit (HOU) of the Nokia WPON solution.

1.1 Scope

The documentation for the HOU provides information about safety, features and functionality, ordering, hardware installation and maintenance, and software installation procedures for the HOU in the current release of the WPON solution.

1.2 Audience

The documentation for the HOU is intended for planners, administrators, operators, and maintenance personnel involved in installing, upgrading, or maintaining the HOU.

1.3 Required knowledge

The reader must be familiar with general telecommunications principles.

1.4 Acronyms and initialisms

The expansions and optional descriptions of most acronyms and initialisms appear in the glossary.

1.5 Assistance and ordering phone numbers

Nokia provides global technical support through regional call centers. Phone numbers for the regional call centers are available at the following URL: http://support.alcatel-lucent.com.

For ordering information, contact your Nokia sales representative.

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1.6   Nokia quality processes

Nokia's HOU quality practices are in compliance with TL 9000 requirements.These requirements are documented in the Fixed Networks Quality Manual 3FQ-30146-6000-QRZZA. The quality practices adequately ensure that technical requirements and customer end-point requirements are met. The customer or its representatives may be allowed to perform on-site quality surveillance audits, as agreed upon during contract negotiations

1.7   Safety information

For safety information, see the appropriate safety guidelines chapter.

1.8   Documents

Documents are available from Nokia using ALED or OLCS.

Procedure 1   To download a ZIP file package of the customer documentation

1   Navigate to http://support.alcatel-lucent.com and enter your user name and password. If you are a new user and require access to this service, please contact your Nokia sales representative.

2   From the Technical Content for drop-down menu, choose the product.

3   Click on Downloads: Electronic Delivery.

4   Choose Documentation from the drop-down menu and click Next.

5   Select the image from the drop-down menu and click Next.

6   Follow the on-screen directions to download the file.

Procedure 2   To access individual documents

Individual PDFs of customer documents are also accessible through the Nokia Customer Support website.

1	Navigate to http://support.alcatel-lucent.com and enter your user name and password. If you are a new user and require access to this service, please contact your Nokia sales representative.
2	From the Technical Content for drop-down menu, choose the product.
3	Click on Manuals and Guides to display a list of customer documents by title and part number. You can filter this list using the Release drop-down menu.
4	Click on the PDF to open or save the file.

1.9   Special information

The following are examples of how special information is presented in this document.

Danger — Danger indicates that the described activity or situation may result in serious personal injury or death; for example, high voltage or electric shock hazards.

Warning — Warning indicates that the described activity or situation may, or will, cause equipment damage or serious performance problems.

Caution — Caution indicates that the described activity or situation may, or will, cause service interruption.

Note — A note provides information that is, or may be, of special interest.

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1.9.1   Steps with options or substeps

When there are options in a step, they are identified by letters. When there are required substeps in a step, they are identified by roman numerals.

Procedure 3   Example of options in a step

At step 1, you must choose option a or b.

1   This step offers two options. You must choose one of the following:

    a   This is one option.

    b   This is another option.

2   You must perform this step.

Procedure 4   Example of required substeps in a step

At step 1, you must perform a series of substeps within the step.

1   This step has a series of substeps that you must perform to complete the step. You must perform the following substeps:

    i   This is the first substep.

    ii   This is the second substep.

    iii   This is the third substep.

2   You must perform this step.

1.10   Multiple PDF document search

You can use Adobe Reader Release 6.0 and later to search multiple PDF files for a common term. Adobe Reader displays the results in a single display panel. The results are grouped by PDF file, and you can expand the entry for each file.

Note — The PDF files in which you search must be in the same folder.

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Procedure 5   To search multiple PDF files for a common term

1	Open Adobe Acrobat Reader.
2	Choose Edit→Search from the Acrobat Reader main menu. The Search PDF panel appears.
3	Enter the search criteria.
4	Click on the All PDF Documents In radio button.
5	Select the folder in which to search using the drop-down menu.
6	Click on the Search button.
	Acrobat Reader displays the search results. You can expand the entries for each document by clicking on the + symbol.

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2 HOU legal and data privacy information

2.1 Purpose

2.2 Data privacy

2.1 Purpose

This chapter describes legal and data privacy information for the HOU.

The information shall not be interpreted as a specification, modification, or amendment to the specification, or additional or other warranty of any kind. In case of discrepancy between this document and product specification or terms and conditions of the valid supply agreement between Nokia and the customer, the supply agreement and product specification shall always prevail over this document.

2.2 Data privacy

2.2.1 Privacy rules

Nokia intends to serve our customers with innovative offerings while complying with privacy rules, and enable our customers to satisfy legal and social privacy requirements.

The development of products, systems, and solutions according to Nokia processes ensures the following:

- respect of end-user privacy
- compliance with privacy laws
- makes it simple and straightforward for Nokia customers to build privacy-respecting services
- offer enhanced protection against unintended use

Nokia strives to perform the following:

- provide products with design and features that enable its operator customers to comply with their privacy obligations
- use reliable and trustworthy methods, that is, no security breaches
- ensure that Nokia products respect the privacy of end-users

2.2.2   Privacy impact assessment

A privacy impact assessment analyzes what subscriber personal data the product supports and what is the effect of potential breaches.

Subscriber personal data is information relating to an identified or identifiable natural person.

Some applications support the export and backup of application data. If the application data contains subscriber personal data, then this subscriber personal data is also exported.

Table 1 describes the data that the HOU collects and stores, and the safeguards that are in place to protect data privacy.

Note — The information in the table is applicable to the current (first) release of the HOU.

<< the table is based on a template that TechComms is developing in consultation with Shawn Abigail; info in the table is taken from 3TG-00001-0007-DSZZA-01P05-Personal Data Inventory for WPON.xlsx; it should be noted that there are discrepancies between the template as used here and the spreadsheet that will need to be resolved, including a separate table for safeguards (the discrepancies are not indicated here, and will need to be approved by Shawn) >>

<< it is not clear to me why there is a row for Serial number >>

Table 1   **HOU data privacy strategy and safeguards**

Data type	Collected by	Purpose of data collection	Stored by	Retention period	Processed	Access restricted by role	Anonymization support	Safeguards
HOU location (HOU GPS longitude, latitude and elevation information)	GPS	Needed to identify the location for HOU equipment	Stored in ConfD	Data is retained as long as the customer record is active. If there are system backups, data may be retained after a customer record is inactive.	No	Only the respective users and administrators have access	Not anonymized	Saved in ConfD in Binary

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Data type	Collected by	Purpose of data collection	Stored by	Retention period	Processed	Access restricted by role	Anonymization support	Safeguards
MAC address (subscriber's MAC address)	Operator	Used for black and white list in ACL	Stored in ConfD	Data is retained as long as the customer record is active. If there are system backups, data may be retained after a customer record is inactive.	Yes	Only the respective users and administrators have access	Not anonymized	Saved in ConfD in Binary
Serial number (equipment serial number)	Not collected	Hardware identification	Saved in flash memory	Data is retained as long as the customer record is active. If there are system backups, data may be retained after a customer record is inactive.	Not applicable	Not applicable	Not applicable	It is not collected, and not used by application

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3 ETSI environmental and CRoHS guidelines

This chapter provides information about the ETSI environmental China Restriction of Hazardous Substances (CRoHS) regulations that govern the installation and operation of the optical line termination (OLT) and Home Outside Unit (HOU) equipment. This chapter also includes environmental operation parameters of general interest.

<< does this chapter need to include OLT info, or should it only cover the HOU? >>

<< this chapter needs to be closely looked at to make sure that it only provides applicable info for the HOU and that no relevant HOU info is missing, as it was copied from a similar chapter in the G-241G-A Product Guide >>

3.1 Environmental labels

This section describes the environmental instructions that are provided with the customer documentation, equipment, and location where the equipment resides.

3.1.1 Overview

CRoHS is applicable to Electronic Information Products (EIP) manufactured or sold and imported in the territory of the mainland of the People's Republic of China. EIP refers to products and their accessories manufactured by using electronic information technology, including electronic communications products and such subcomponents as batteries and cables.

3.1.2 Environmental related labels

Environmental labels are located on appropriate equipment. The following are sample labels.

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3.1.2.1 Products below Maximum Concentration Value (MCV) label

Figure 1 shows the label that indicates a product is below the maximum concentration value, as defined by standard SJ/T11363-2006 (Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products). Products with this label are recyclable. The label may be found in this documentation or on the product.

Figure 1   **Products below MCV value label**

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3.1.2.2 Products containing hazardous substances above Maximum Concentration Value (MCV) label

Figure 2 shows the label that indicates a product is above the maximum concentration value, as defined by standard SJ/T11363-2006 (Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products). The number contained inside the label indicates the Environment-Friendly User Period (EFUP) value. The label may be found in this documentation or on the product.

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Figure 2 **Products above MCV value label**

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Together with major international telecommunications equipment companies, Nokia has determined it is appropriate to use an EFUP of 50 years for network infrastructure equipment and an EFUP of 20 years for handsets and accessories. These values are based on manufacturers' extensive practical experience of the design, manufacturing, maintenance, usage conditions, operating environments, and physical condition of infrastructure and handsets after years of service. The values reflect minimum values and refer to products operated according to the intended use conditions. See "Hazardous Substances Table (HST)" for more information.

3.2   Hazardous Substances Table (HST)

This section describes the compliance of the OLT and HOU equipment to the CRoHS standard when the product and subassemblies contain hazardous substances beyond the MCV value. This information is found in this user documentation where part numbers for the product and subassemblies are listed. It may be referenced in other OLT and HOU documentation.

In accordance with the People's Republic of China Electronic Industry Standard Marking for the Control of Pollution Caused by Electronic Information Products (SJ/T11364-2006), customers may access the Nokia Hazardous Substance Table, in Chinese, from the following location:

- http://www.alcatel-sbell.com.cn/wwwroot/images/upload/private/1/media/ChinaRoHS.pdf

3.3   Other environmental requirements

Observe the following environmental requirements when handling the OLT or HOU equipment.

3.3.1   HOU environmental requirements

See chapter 7 in this product guide for more information about temperature ranges.

3.3.2   Storage

According to ETS 300-019-1-1 - Class 1.1, storage of HOU equipment must be in Class 1.1, weather-protected, temperature-controlled locations.

<< is the above correct? >>

3.3.3   Transportation

According to EN 300-019-1-2 - Class 2.3, transportation of the HOU equipment must be in packed, public transportation with no rain on packing allowed.

<< is the above correct? >>

3.3.4   Stationary use

According to EN 300-019-1-3 - Class 3.1/3.2/3.E, stationary use of OLT equipment must be in a temperature-controlled location, with no rain allowed, and with no condensation allowed.

<< is there an equivalent statement to the above for the HOU? >>

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3.3.5   Thermal limitations

When the OLT is installed in the CO or CEV, install air filters on the OLT. The thermal limitations for OLT operation in a CO or CEV are:

- operating temperature: 5°C to 40°C (41°F to 104°F)
- short-term temperature: –5°C to 50°C (23°F to 122°F)
- operating relative humidity: 5% to 85%
- short-term relative humidity: 5% to 95%, but not to exceed 0.024 kg of water/kg

<< is there an equivalent to the above for the HOU? >>

3.3.6   Material content compliance

European Union (EU) Directive 2002/95/EC, "Restriction of the use of certain Hazardous Substances" (RoHS), restricts the use of lead, mercury, cadmium, hexavalent chromium, and certain flame retardants in electrical and electronic equipment. This Directive applies to electrical and electronic products placed on the EU market after 1 July 2006, with various exemptions, including an exemption for lead solder in network infrastructure equipment. Nokia products shipped to the EU after 1 July 2006 comply with the EU RoHS Directive.

Nokia has implemented a material/substance content management process. The process is described in: Nokia process for ensuring RoHS Compliance (1AA002660031ASZZA). This ensures compliance with the European Union Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS2). With the process equipment is assessed in accordance with the Harmonised Standard EN50581:2012 (CENELEC) on Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

3.3.7   End-of-life collection and treatment

Electronic products bearing or referencing the symbol shown in Figure 3, when put on the market within the European Union (EU), shall be collected and treated at the end of their useful life, in compliance with applicable EU and local legislation. They shall not be disposed of as part of unsorted municipal waste. Due to materials that may be contained in the product, such as heavy metals or batteries, the environment and human health may be negatively impacted as a result of inappropriate disposal.

Note — In the European Union, a solid bar under the symbol for a crossed-out wheeled bin indicates that the product was put on the market after 13 August 2005.

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Figure 3   **Recycling/take back/disposal of product symbol**

At the end of their life, the OLT and HOU are subject to the applicable local legislations that implement the European Directive 2012/19EU on waste electrical and electronic equipment (WEEE).

There can be different requirements for collection and treatment in different member states of the European Union.

In compliance with legal requirements and contractual agreements, where applicable, Nokia will offer to provide for the collection and treatment of Nokia products bearing the logo shown in Figure 3 at the end of their useful life, or products displaced by Nokia equipment offers. For information regarding take-back of equipment by Nokia, or for more information regarding the requirements for recycling/disposal of product, contact your Nokia account manager or Nokia take back support at sustainability.global@nokia.com.

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4 ETSI safety guidelines

This chapter provides information about the mandatory regulations that govern the installation and operation of the Home Outside Units (HOUs) of the Nokia WPON solution in the ETSI market.

<< this chapter needs to be closely looked at to make sure that it only provides applicable info for the HOU and that no relevant HOU info is missing, as it was copied from a similar chapter in the G-241G-A Product Guide >>

4.1 Safety instructions

This section describes the safety instructions that are provided in the HOU customer documentation and on the HOU equipment.

4.1.1 Safety instruction boxes

The safety instruction boxes are provided in the HOU customer documentation. Observe the instructions to meet safety requirements.

The following is an example of the Danger box.

Danger — Possibility of personal injury.

The Danger box indicates that the described activity or situation may pose a threat to personal safety. It calls attention to a situation or procedure which, if not correctly performed or adhered to, may result in death or serious physical harm.

Do not proceed beyond a Danger box until the indicated conditions are fully understood and met.

The following is an example of the Warning box.

Warning 1 — Possibility of equipment damage.

Warning 2 — Possibility of data loss.

The Warning box indicates that the described activity or situation may, or will, cause equipment damage, loss of data, or serious performance problems. It identifies a possible equipment-damaging situation or provides essential information to avoid the degradation of system operations or data.

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Do not proceed beyond a warning until the indicated conditions are fully understood and met.

The following is an example of the Caution box.

Caution 1 — Possibility of service interruption.

Caution 2 — Service interruption.

The Caution box indicates that the described activity or situation may, or will, cause service interruption.

Do not proceed beyond a caution until the indicated conditions are fully understood and met.

The following is an example of the Note box.

Note — Information of special interest.

The Note box provides information that assists the personnel working with HOU equipment. It does not provide safety-related instructions.

4.1.2   Safety-related labels

The HOU equipment is labeled with the specific safety instructions and compliance information that is related to a product, or product variant, of the HOU equipment. Observe the instructions on the safety labels.

Table 2 provides sample safety labels on the HOU equipment.

Table 2   **Safety labels**

Description	Label text
ESD warning	Caution: This assembly contains an electrostatic sensitive device.
PSE marking	These power supplies are Japan PSE certified and compliant with Japan VCCI emissions standards.

Figure 4 shows the PSE certification.

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Figure 4   **PSE certification**

4.2   Safety standards compliance

This section describes the HOU equipment compliance with the European safety standards.

4.2.1   EMC, EMI, and ESD compliance

The HOU equipment complies with the following EMC, EMI, and ESD requirements:

- EN 300-386 V1.5.1: Electromagnetic Compatibility and Radio Spectrum Matters (ERM): Telecommunications Network Equipment; Electromagnetic Compatibility (EMC) requirements; Electrostatic Discharge (ESD) requirements
- EN 55022 (2006): Class B, Information Technology Equipment, Radio Disturbance Characteristics, limits and methods of measurement
- EN 55024 (2010): Information Technology Equipment, Immunity Characteristics, limits and methods of measurement
- European Council Directive 2004/108/EC
- EN 300-386 V1.4.1: 2008
- EN 55022:2006 Class B

4.2.2   Equipment safety standard compliance

The HOU equipment complies with the requirements of EN 60950-1, Safety of Information Technology Equipment for use in a restricted location (per R-269).

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4.2.3   Environmental standard compliance

The HOU equipment complies with the EN 300 019 European environmental standards.

4.2.4   Resistibility requirements compliance

The HOU equipment complies with the requirements of ITU Recommendation K.21 for resistibility of telecommunication equipment installed in customer premises to over voltage and overcurrents.

<< does the above statement apply to the HOU? >>

4.2.5   Acoustic noise emission standard compliance

The HOU equipment complies with EN 300 753 acoustic noise emission limit and test methods.

4.3   Electrical safety guidelines

This section provides the electrical safety guidelines for the HOU equipment.

Note 1 — The HOU equipment complies with the U.S. National Electrical Code. However, local electrical authorities have jurisdiction when there are differences between the local and U.S. standards.

Note 2 — The HOU equipment complies with BS EN 61140.

4.3.1   Power supplies

The use of any non-Nokia approved power supplies or power adapters is not supported or endorsed by Nokia. Such use will void any warranty or support contract with Nokia. Such use greatly increases the danger of damage to equipment or property.

4.3.2   Cabling

The following are the guidelines regarding cables used for the HOU equipment:

- All cables must be approved by the relevant national electrical code.
- The cables for outdoor connection to the HOU equipment must be suitable for outdoor use.
- POTS wiring run outside the subscriber premises must comply with the requirements of local electrical codes. In some markets, the maximum allowed length of the outside run is 140 feet (43 m). If the outside run is longer, NEC requires primary protection at both the exit and entry points for the wire.

<< remove the last bullet since it refers to POTS? >>

4.3.3   Protective earth

Earthing and bonding of the HOU equipment must comply with the requirements of local electrical codes.

4.4   ESD safety guidelines

The HOU equipment is sensitive to ESD. Operations personnel must observe the following ESD instructions when they handle the HOU equipment.

⚠️ **Caution —** This equipment is ESD sensitive. Proper ESD protections should be used when you enter the TELCO Access portion of HOU equipment.

During installation and maintenance, service personnel must wear wrist straps to prevent damage caused by ESD.

4.5   Environmental requirements

See section 7.6 in this guide for information about temperature ranges.

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During operation in the supported temperature range, condensation inside the HOU equipment caused by humidity is not an issue. To avoid condensation caused by rapid changes in temperature and humidity, Nokia recommends:

- The door of the HOU equipment not be opened until temperature inside and outside the equipment has stabilized.
- If the door of the HOU equipment must be opened after a rapid change in temperature or humidity, use a dry cloth to wipe down the metal interior to prevent the risk of condensation.
- When high humidity is present, installation of a cover or tent over the HOU equipment helps prevent condensation when the door is opened.

<< does the HOU have a "door"? >>

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5 ANSI safety guidelines

This chapter provides information about the mandatory regulations that govern the installation and operation of the Home Outside Units (HOUs) of the Nokia WPON solution in the North American or ANSI market.

<< this chapter needs to be closely looked at to make sure that it only provides applicable info for the HOU and that no relevant HOU info is missing, as it was copied from a similar chapter in the G-241G-A Product Guide >>

5.1 Safety instructions

This section describes the safety instructions that are provided in the HOU customer documentation and on the HOU equipment.

5.1.1 Safety instruction boxes in customer documentation

The safety instruction boxes are provided in the HOU customer documentation. Observe the instructions to meet safety requirements.

The following is an example of the Danger box.

Danger — Possibility of personal injury.

The Danger box indicates that the described activity or situation may pose a threat to personal safety. It calls attention to a situation or procedure which, if not correctly performed or adhered to, may result in death or serious physical harm.

Do not proceed beyond a Danger box until the indicated conditions are fully understood and met.

The following is an example of the Warning box.

Warning 1 — Possibility of equipment damage.

Warning 2 — Possibility of data loss.

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The Warning box indicates that the described activity or situation may, or will, cause equipment damage, loss of data, or serious performance problems. It identifies a possible equipment-damaging situation or provides essential information to avoid the degradation of system operations or data.

Do not proceed beyond a warning until the indicated conditions are fully understood and met.

The following is an example of the Caution box.

Caution 1 — Possibility of service interruption.

Caution 2 — Service interruption.

The Caution box indicates that the described activity or situation may, or will, cause service interruption.

Do not proceed beyond a caution until the indicated conditions are fully understood and met.

The following is an example of the Note box.

Note — Information of special interest.

The Note box provides information that assists the personnel working with HOU equipment. It does not provide safety-related instructions.

5.1.2   Safety-related labels

The HOU equipment is labeled with specific safety compliance information and instructions that are related to a variant of the HOU. Observe the instructions on the safety labels.

Table 3 provides examples of the text in the various HOU equipment safety labels.

<< some of the examples in the table have "ONT" >>

Table 3   **Safety labels**

Description	Label text
UL compliance	Communication service equipment US listed. Type 3R enclosure - Rainproof.
TUV compliance	Type 3R enclosure - Rainproof.

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Description	Label text
ESD warning	Caution: This assembly contains electrostatic sensitive device.
Laser classification	Class 1 laser product
Laser product compliance	This laser product conforms to all applicable standards of 21 CFR 1040.10 at date of manufacture.
FCC standards compliance	Tested to comply with FCC standards for home or office use.
CDRH compliance	Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007
Operation conditions	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Canadian standard compliance (modular ONT)	This Class A digital apparatus complies with Canadian ICES-003.
Canadian standard compliance (outdoor ONT)	This Class B digital apparatus complies with Canadian ICES-003.
CE marking	There are various CE symbols for CE compliance.

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Figure 5 shows a sample safety label on the HOU equipment.

<< will need a new label, as the existing one shows "home or office use" >>

Figure 5   **Sample safety label on the HOU equipment**

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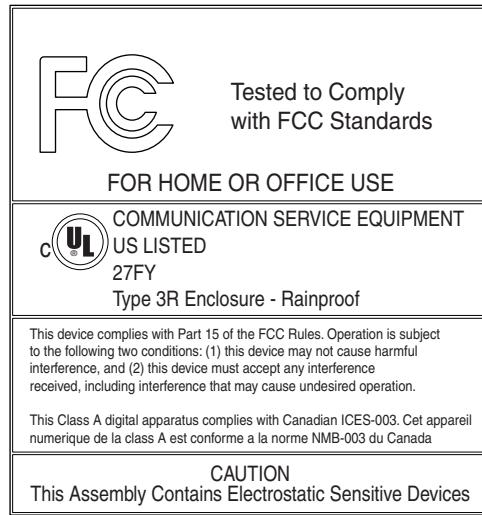
5.2   Safety standards compliance

This section describes the HOU equipment compliance with North American safety standards.

⚠ **Warning** — Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

5.2.1   EMC, EMI, and ESD standards compliance

The HOU equipment complies with the following requirements:

<< reword first bullet? >>

- Federal Communications Commission (FCC) CFR 47, Part 15, Subpart B, Class A requirements for << HOU? >> equipment
- GR-1089-CORE requirements, including:
  - Section 3 Electromagnetic Interference, Emissions Radiated and Conducted
  - Section 3 Immunity, Radiated and Conducted
  - Section 2 ESD Discharge Immunity: System Level Electrostatic Discharge and EFT Immunity: Electrically Fast Transients
- ICES-003
- CAN/CSA C22.2 No. 60950-1

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is needed.
- Consult the dealer or an experienced radio/TV technician for help.

5.2.2   Equipment safety standard compliance

The HOU equipment complies with the requirements of UL60950-1, Outdoor ONTs to "Communication Service Equipment" (CSE) and Indoor ONTs to Information Technology Equipment (ITE).

<< is "ONT" valid for both of these in the above statement? >>

5.2.3   Environmental standards compliance

The HOU equipment complies with the following standards:

- GR-63-CORE (NEBS): requirements related to operating, storage, humidity, altitude, earthquake, office vibration, transportation and handling, fire resistance and spread, airborne contaminants, illumination, and acoustic noise
- GR-487-CORE: requirements related to rain, chemical, sand, and dust
- GR-487 R3-82: requirements related to condensation
- GR-3108: Requirements for Network Equipment in the Outside Plant (OSP)
- TP76200: Common Systems Equipment Interconnections Standards

5.2.4   Resistibility requirements compliance

The HOU equipment complies with the requirements of ITU Recommendation K.21 for resistibility of telecommunication equipment installed in customer premises to overvoltage and overcurrents.

<< does the above statement apply to the HOU? >>

5.3   Electrical safety guidelines

This section provides the electrical safety guidelines for the HOU equipment.

Note — The HOU equipment complies with the U.S. National Electrical Code. However, local electrical authorities have jurisdiction when there are differences between the local and U.S. standards.

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5.3.1   Power supplies

The use of any non-Nokia approved power supplies or power adapters is not supported or endorsed by Nokia. Such use will void any warranty or support contract with Nokia. Such use greatly increases the danger of damage to equipment or property.

5.3.2   Cabling

The following are the guidelines regarding cables used for the HOU equipment:

- Use only cables approved by the relevant national electrical code.
- Use cables suitable for outdoor use for connection to HOU equipment.
- The HOU equipment has been evaluated for use with external POTS wiring without primary protection that may not exceed 140 ft (43 m) in reach. However, the power cable must not exceed 100 ft (31 m).

<< remove last bullet since it refers to POTS? >>

5.3.3   Protective earth

Earthing and bonding of the HOU equipment must comply with the requirements of NEC article 250 or local electrical codes.

5.4   ESD safety guidelines

The HOU equipment is sensitive to ESD. Operations personnel must observe the following ESD instructions when they handle the HOU equipment.

Caution — This equipment is ESD sensitive. Proper ESD protections should be used when entering the TELCO Access portion of the HOU equipment.

During installation and maintenance, service personnel must wear wrist straps to prevent damage caused by ESD.

Nokia recommends that you prepare the site before you install the HOU equipment. In addition, you must control relative humidity, use static dissipating material for furniture or flooring, and restrict the use of air conditioning.

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5.5   Environmental requirements

See section 7.6 in this guide for temperature ranges for HOU equipment.

During operation in the supported temperature range, condensation inside the HOU equipment caused by humidity is not an issue. To avoid condensation caused by rapid changes in temperature and humidity, Nokia recommends:

- The door of the HOU equipment not be opened until temperature inside and outside the enclosure has stabilized.
- If the door of the HOU equipment must be opened after a rapid change in temperature or humidity, use a dry cloth to wipe down the metal interior to prevent the risk of condensation.
- When high humidity is present, installation of a cover or tent over the HOU equipment helps prevent condensation when the door is opened.

<< does the HOU have a door? >>

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6 WPON solution overview

6.1 << something to consider >>

<< A more detailed version of this chapter (12+ pages) is in the AP Product Guide.We need to determine if the stripped down version presented here should remain or if it should be replaced with one like the chapter in the AP Product Guide. It should be kept in mind that keeping two almost identical chapters in the two product guides is an invitation for them getting out of sync and as well the AP as an entity is more of a WPON big picture kind of item and the HOU as an entity is more of just a subscriber-type item that wirelessly connects to an AP. It seems to make sense to have the stripped version in the HOU Product Guide as presented here. >>

6.2 WPON solution

The Nokia Wireless PON solution provides a 60 GHz wireless drop for PON or P2P-based optic networks so that fiber optic cables are not used for connection to subscribers' homes. The WPON has an Access Point (AP) that physically connects to the PON or P2P-based optic network. The AP uses 802.11ad for wireless communication with up to six Home Outside Units (HOUs) that provide Gigabit Ethernet connectivity to CPE inside subscribers homes.

<< do we need to provide more info about PONs and/or or P2P-based optic networks? What exactly is a "P2P-based optic network" - does it refer to GE, 2,5G, 10G Optical Ethernet? >> << there is quite a difference between a PON, which is a "point to multipoint" network, and a point to point network >> << can the PON be GPON, EPON, or other types of PONs? >>

By using 802.11ad, the WPON solution offers limited interference between systems because of narrow beams and inherent propagation limitations.

Figure 6 shows a high-level representation of the WPON solution providing a wireless drop from a PON or P2P-based optic network to three subscriber homes.

Figure 6   **High-level representation of the WPON solution**

<< new figure to go here >>

The WPON solution can be used with a fiber distribution network that includes the Nokia 7342 ISAM FTTU P-OLT as shown in Figure 7.

Figure 7   **Example of three WPONs connected to a PON that uses a P-OLT**

<< new figure that has three WPONs instead of the nine ONTs that are in the "fiber distribution network" figure typically used in the OLT and ONT documentation >>

6.2.1   APs and AP pairs

The AP provides the optical-to-wireless conversion for the WPON solution. The AP can be installed on a utility pole or on the outside of a building and uses 802.11ad for wireless line-of-sight communication with up to six HOUs up to 300 m away << or is it 100m? >>. An AP contains a GPS and magnetometer, enabling it to report its location and orientation to the management system. See the *AP Product Guide* for detailed information about APs.

<< check distance in above paragraph >>

Two APs can be installed as a pair on a utility pole to provide wider wireless coverage, such as to HOUs on houses on both sides of a street, In this case the two APs are known as an AP pair and they are connected to each other through a 2.5 Gigabit electrical Ethernet cable that handles all the traffic between the two APs. An AP pair is considered to be a single AP, with one of APs of the pair serving as the Main AP and the other AP as the Extension AP.

Figure 8 shows an AP pair, with each AP of the AP pair using 802.11ad for wireless line-of-sight communication with three HOUs.

Figure 8   **Example of an AP pair**

<< new figure to go here >>

6.2.2   HOUs

An HOU provides the wireless-to-Gigabit Ethernet electrical conversion for the WPON solution at the subscriber premises. Based on 802.11ad, an HOU can be considered to be a wireless station (STA). An HOU is installed on the outside of a subscriber's home and uses a Gigabit Ethernet electrical cable for physical connectivity to CPE such as a residential gateway inside the home. The same cable is used to provide power over Ethernet to the HOU. An HOU contains a GPS and magnetometer, enabling it to report its location and orientation to the management system.

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After physical installation and power up, an HOU automatically connects to the best AP available, reports its presence, gets configured, and initiates service per the customer subscribed service type. The HOU also detects any neighboring APs in its line of sight and reports these to the management system.

See chapter 7 for detailed information about HOUs.

6.2.3   WPONs

A PON or a P2P-based optic network can have multiple WPONs; for example, the PON shown in Figure 7 has three WPONs.

At a minimum, a WPON consists of one AP and at least one HOU.

A WPON has a single NNI point at the optical connection point of the AP with the PON or P2P-based optic network.

A WPON can have multiple UNI points, one at each HOU that is part of the WPON.

An OLT in the PON sees each WPON as a NNI; the OLT does not see the UNIs. In this respect, a WPON is seen in a similar way as a subtending node, such as a DPU.

The number of APs and HOUs in a WPON depends on the topology used for the WPON. See the *AP Product Guide* for more information about WPON topologies.

6.2.4   More information about the WPON solution

See the *AP Product Guide* for more information about the WPON solution.

6.3   Compatible CPE

<< Include a table here, or in the CRN, that lists CPE that can connect to the HOU? If here, should it be in the AP product guide as well as in the HOU product guide? >>

The following table lists CPE that is compatible with the HOU.

<< need info to create table >>

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DRAFT

7 HOU unit data sheet

7.1 HOU part numbers and identification

7.2 HOU general description

7.3 HOU software and installation feature support

7.4 Subscriber traffic interfaces on the HOU

7.5 HOU LED information

7.6 HOU specifications

7.7 GEM ports and T-CONTs

7.8 Performance monitoring statistics

7.9 Functional blocks

7.10 HOU standards compliance

7.11 HOU special considerations

7.1 HOU part numbers and identification

Table 4 provides part numbers and identification information for the HOU.

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Table 4   **HOU part numbers and identification**

Part number	Provisioning number	Description	CLEI	CPR	ECI/ Bar code
3FE 47290 AA << confirm >>	<< need >>	HOU with one 802.11ad baseband unit and one Gigabit Ethernet port. The 802.11ad baseband unit is used for wireless connection to an AP. The Gigabit Ethernet port is used for connection to CPE, such as a residential gateway, through a Cat5 cable. The HOU is POE-powered through the Cat 5 cable. << is anything included, such as the Cat5 cable and mounting hardware? since we don't know the length of cabling needed between the HO and CPE, is it even possible to provide a cable >>	<< need >>	<< need >>	<< need >>

Table 5 provides accessory ordering information for HOUs.

<< are there any orderable accessories for the HOUs? what about the Cat5 cable and wall-mounting hardware? >>

Table 5   **HOU accessories**

Accessory	Orderable part number	Notes
<< need >>	<< need >>	<< need >>
<< need >>	<< need >>	<< need >>

7.2   HOU general description

An HOU provides the wireless-to-Gigabit Ethernet electrical conversion for the WPON solution at the subscriber premises. The HOU is installed on the outside of a subscriber's home and uses a Gigabit Ethernet electrical cable for physical connectivity to CPE such as a residential gateway inside the home. See section 6.2 in this guide for more information about the WPON solution.

On the wireless side, the HOU is compliant with 802.11ad supporting unlicensed 60 GHz mmWave wireless line-of-sight communication with 1 Gb/s peak speeds.

On the subscriber side, the HOU is compliant with <<need info >>

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The HOU is managed through the WPON manager and the Nokia Altiplano cloud-native access platform. A local craft terminal access point is provided on the HOU through a Bluetooth interface (classical Bluetooth, reach greater than 20 m). See the *AP Product Guide* for more information about management of the WPON solution.

The HOU provides the following functions and features:

- wireless-to-Gigabit Ethernet conversion
- up to 3 Gbps aggregate capacity, supporting 1 Gbps peak speeds to an AP up to 100 m << or is it 300 m >> away << confirm aggregate vs peak values >>
- automatically connects to the best AP available, reports its presence, gets configured, and initiates service per the customer subscribed service type
- detects any neighboring APs in its line of sight and reports these to the management system
- beam-forming antennas for fast and reliable wireless connection
- wide field of view for antennas (180 degrees horizontal and 60 degrees vertical) means there is no need to aim the antenna
- installed on the outside of a subscriber's home
- provides symmetrical Ethernet connectivity at Gigabit speeds to CPE over a Cat5 cable
- POE-powered over the Cat5 cable that connects to the CPE
- sends dying gasp signal upstream if loss of power occurs
- has a built-in GPS and magnetometer
- robust design for harsh conditions (IP66)
- small size (12 cm by 12 cm by 4 cm) means that it is barely noticeable on building
- MDI/MDIX auto sensing << confirm the HOU has this for its Ethernet connection to the CPE>>
- network demarcation for all services << confirm if the AP or HOU does this >>
- interworking functions between the GEM and Ethernet layers << confirm the HOU does this >>
- mux and demux functions to the PON or P2P optical network<< confirm the AP, not the HOU does this >>
- G984.4 standard and revised compliant OMCI interface for management and provisioning << confirm the HOU has this >>
- on/off button << confirm the HOU has this >>
- support for AIS with DOWN MEP << confirm the HOU has this >>

7.3   HOU software and installation feature support

Software for the HOU is managed through the WPON manager and the Nokia Altiplano; see the *AP Product Guide* for information about the WPON manager and Nokia Altiplano.

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For information about installing or replacing an HOU, see the following chapters:

- chapter 8 (Pre-installation steps for an HOU)
- chapter 9 (Procedures to install an HOU)
- chapter 10 (Procedures to replace an HOU)

7.4 Subscriber traffic interfaces on the HOU

Table 6 describes the supported subscriber traffic interfaces for the HOU.

Table 6   **HOU subscriber traffic interfaces**

Wireless	Ethernet
One for communication with an AP	One Gigabit Ethernet for connection to CPE; the same connection is used for power over Ethernet

7.4.1 HOU physical connections and components

Figure 9 shows the HOU physical connections and components and section 7.4.2 describes the wireless components.

Figure 9   **HOU physical connections and components**

<< add figure that has HOU connections and components (if no components, then change title of section and figure) >>

Table 7 describes the HOU physical connections and components.

Table 7   **HOU physical connections and components**

Connection or component	Description
Ethernet connection	This connection is provided through an RJ 25 connector. It is used for used for connecting to CPE, such as a residential gateway, through a Cat5 cable. POE power is provided through the same cable.
Ground connection	<< is there a ground point? >>
On/off button	This button turns the HOU on or off << is there an on/off button? >>
Reset button	This button turns resets the HOU << is there a reset; if yes is it a button with a narrow hole? >>

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7.4.2   HOU wireless components

The HOU has one 802.11ad baseband unit for wireless communication with an AP:

- the 802.11ad baseband unit has three single-tile 32-antenna/RF arrays that have a scan range of +/- 90° Azimuth, +30°+x /-30°+x elevation, antenna tiles tilted upwards, angle x << need values for "x" >>
- the 32-antenna/RF arrays use vertical polarization and are located at the center line of the HOU

7.5   HOU LED information

The HOU has a single multifunction LED that is software-defined to light under certain conditions.

Figure 10 shows the location of the LED.

Figure 10   **HOU LED location**

<< add figure showing location of the LED>>

Table 8 describes the HOU LED. << need info for HOU LED >>

Table 8   **HOU LED behavior description**

LED color and behavior	LED behavior description
Off	<< need >>
Solid green	<< need >>
Solid red	<< need >>
Flashing green (fast)	<< need >>
Flashing green (slow)	<< need >>
Flashing red (fast)	<< need >>
Flashing red (slow)	<< need >>
<< any other (eg alternating red and green)? >>	<< need >>

7.6   HOU specifications

Table 9 lists the physical specifications for the HOU.

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Table 9   **HOU physical specifications**

Dimensions	Specifications
Height	<< need >>
Width	<< need >>
Depth	<< need >>
Weight [within ± 0.5 lb (0.23 kg)]	<< need >>

Table 10 lists power consumption specifications for the HOU.

Table 10   **HOU power consumption specifications**

Maximum power (not to exceed)	Condition	Minimum power	Condition
<< need >>	<< need >>	<< need >>	<< need >>

Table 11 lists the environmental requirements for the HOU.<< need to verify >>

Table 11   **HOU environmental requirements**

Mounting method	Temperature range and humidity	Altitude
On an outside wall	Operating: 23°F to 122°F (-5°C to 50°C) ambient temperature 5% to 85% relative humidity, non-condensing	Maximum operating altitude is 10 000 ft (3048 m) above mean sea level
	Storage: −40°F to 140°F (−40° to 60°C) 5% to 93% relative humidity, non-condensing	Maximum non-operating altitude is 40 000 ft (12 192 m) above mean sea level

7.7   GEM ports and T-CONTs

<< this section is as per the G-241G-A ONT product guide - does any of it apply to the HOU? >>

Table 12 lists the maximum number of supported T-CONTs and GEM ports for G-241G-A ONT. Not all ONTs will be supported in all of the releases indicated the table. See the appropriate release Customer Release Notes for the most accurate list of supported devices.

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Table 12   **G-241G-A ONT capacity for GEM ports and T-CONTs**

ONT or MDU	Maximum	Notes
Package P ONTs		
GEM ports per ONT	124	124 are present; 122 are available, and 2 are reserved for multicast and debugging
T-CONTs per ONT	32	32 are present; 31 are available, and 1 is reserved for OMCI

7.8   Performance monitoring statistics

<< this section is as per the G-241G-A ONT product guide - does any of it apply to the HOU? >>

The following section identifies the supported performance monitoring statistics for G-241G-A ONT. A check mark indicates the statistic is supported on that ONT. An empty cell indicates the statistic is not supported. The following tables are categorized by supported alarm types:

• Table 13 provides statistics for ONTENET type counters
• Table 14 provides statistics for ONTL2UNI type counters
• Table 15 provides statistics for PONONTTC, PONONTMCTC, PONONTTCHSI, PONONTTCCES, PONONTTCFLOW, and PONONTTCVOIP type counters
• Table 16 provides statistics for PONONTTC aggregate type counters

Note — If you have trouble accessing G-241G-A ONT performance monitoring statistics using TL1, please contact your Nokia support representative for more information about how to access and retrieve performance monitoring type counters.

Table 13   **G-241G-A ONT ONTENET performance monitoring statistics**

ONT	ONTENET statistics													
	FCSE	EC	LC	RBO	SCF	MCF	DT	IMTE	CSE	AE	IMRE	FTL	TBO	SQE
GPON														
G-241G-A [1]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note
[1]   A 5 second polling window limitation exists on the ONT, therefore the margin of error for each 15-min window is 5 seconds

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Table 14　　G-241G-A ONT ONTL2UNI performance monitoring statistics

ONT	ONTL2UNI statistics										
	FRAMES	BYTES	MCFRAMES	DSDRPDFRMS	USDRPDFRMS	USFRAMES	DSFRAMES	USBYTES	DSBYTES	USMCFRAMES	DSMCFRAMES
GPON											
G-241G-A [1]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note

[1]　A 5 second polling window limitation exists on the ONT, therefore the margin of error for each 15-min window is 5 seconds

Table 15　　G-241G-A ONT PONONTTC, PONONTMCTC, PONONTTCHSI, PONONTTCCES, PONONTTCFLOW, PONONTTCVOIP performance monitoring statistics

ONT	PONONTTC, PONONTMCTC, PONONTTCHSI, PONONTTCCES, PONONTTCFLOW, PONONTTCVOIP statistics					
	TXBLOCKS	TXFRAGS	RXBLOCKS	RXFRAGS	LOSTFRAGS	BADGEMHDRS
GPON						
G-241G-A [1]	✓	✓	✓	✓	✓	

Note

[1]　A 5 second polling window limitation exists on the ONT, therefore the margin of error for each 15-min window is 5 seconds

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Table 16   **G-241G-A ONT PONONTTC aggregate performance monitoring statistics**

ONT	PONONTTC (aggregate) statistics					
	TXBLOCKS	TXFRAGS	RXBLOCKS	RXFRAGS	LOSTFRAGS	BADGEMHDRS
GPON						
G-241G-A [(1)]	✓	✓	✓	✓	✓	

Note

[(1)]   A 5 second polling window limitation exists on the ONT, therefore the margin of error for each 15-min window is 5 seconds

7.9   Functional blocks

Figure 11 shows the functional blocks for the HOU.

Figure 11   **Functional blocks of an HOU**

<< add figure showing the functional blocks of an HOU >>

Figure 12 shows the SoC functional block in more detail.

Figure 12   **SOC functional block**

<< add figure showing the SoC functional block >>

The SoC for the HOU consists of the following key elements:

- Ethernet MAC:
  The SoC provides up to four GE MACs. << confirm >>
- Control Processor:
  The Control Processor features an integral memory management unit that supports a dedicated 64 kbyte instruction cache and shares a single 32 kbyte data cache with the DSP. The Control Processor and DSP also include a single channel Data Management Application (DMA) controller with a 4 kbyte read ahead low-latency Dynamic Random Access Memory (DRAM) access port. The processors typically run at 400 MHz.

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- Switch matrix:
  The Switch matrix provides an integrated data channel between the four GE
  MACs, the GPON MAC, the control processor, and the other integrated elements
  such as flash memory, DRAM, and the local bus controller.

7.10 HOU standards compliance

The HOUcompliant with the following standards: << the following list is from the
G-241G-A ONT product guide - it needs to be reviewed carefully to
make sure that it is complete and accurate with respect to the HOU >>

- EN-300019-2-1 (Class T1.2)
- EN-300019-2-2 (Class T2.3)
- EN-300019-2-3 (Class T3.2))
- ETL
- FCC (Class B)/CAN ICES-003
- IEEE 802.1p (QoS)
- IEEE 802.1q (VLANs)
- IEEE 802.3ab, 3i 3u (GE)
- IEEE 802.3 (2012) (auto-negotiation)
- IEEE 802.3x (flow control)
- MEF 2.0
- ITU-T G.984 (GPON interface framing)
- ITU-T G.984.2 (1.25 Gb/s, 2.5 Gb/s)
- ITU-T G.984.3 (activation with automatic discovery of a serial number and a
  password)
- ITU-T G.984.4 (standard and revised) (OMCI interface for ONT management and
  provisioning)

7.10.1 Energy-related products standby and off modes compliance

<< this section needs to be confirmed >>

Hereby, Nokia declares that the HOU is in compliance with the essential
requirements and other relevant provisions of Directive 2009/125/EC together with
Commission Regulation (EC) No 1275/2008 and Commission Regulation (EC) No
801/2013.

The HOU qualifies as equipment with high network availability (HiNA) functionality.
Since the main purpose of the HOU is to provide network functionality with HiNA 7
days /24 hours, the modes Off/Standby, Power Management, and Networked
Standby are inappropriate.

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For information about the type and number of network ports, see "Subscriber traffic interfaces on the HOU" in this chapter.

For information about power consumption, see "HOU specifications" in this chapter.

7.10.2   HOU compliance statement

<< this section needs to be confirmed >>

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1   This device may not cause harmful interference.
2   This device must accept any interference received, including interference that may cause undesired operation.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is needed.
• Consult the dealer or an experienced radio/TV technician for help.

7.10.3   Responsible party

<< this section needs to be confirmed >>

<< if it is Raleigh, is the phone number and other info correct? >>

Table 17 lists the party in the US responsible for the HOU.

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Table 17   Responsible party contact information

Legal Company name	Nokia USA Inc.
Address	2301 SUGAR BUSH RD. STE 300, RALEIGH,NC 27612
Phone, Fax	+1 919 850 6127

7.11   HOU special considerations

<< are there any special considerations and limitations for the HOU? >>
<< the following table is for reference, as it is from the G-241G-A ONT product guide >>

Table 18   G-241G-A ONT considerations and limitations

Considerations and limitations
Call History Data collection (ONTCALLHST) is supported, except for the following parameters: RTP packets (discarded), far-end RTCP and RTCP-XR participation, RTCP average and peak round trip delay, MOS, average jitter, number of jitter-buffer over-runs and under runs.
Some voice features are configurable on a per ONT basis, including Call Waiting, Call Hold, 3-Way Calling, and Call Transfer.
The following voice features / GSIP parameters are configurable on a per-Client/ per-ONT basis (not per-Subscriber): • Enable Caller ID and Enable Caller Name ID • Digitmap and the associated Interdigit and Critical timers and Enter key parameters • Warmline timer is enabled per subscriber, but the warmline timer value is configured per ONT and must have a lower value than the Permanent time • Miscellaneous timers: Permanent, Timed-release, Reanswer, Error-tone, and CW-alert timers • Features / functions: Message waiting mode, WMWI refresh interval, DTMF volume level • Service Codes for the following features: CCW, Call Hold and Warmline

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8 Pre-installation steps for an HOU

8.1   General

<< the purpose of this chapter is to cover installation-related items that should be addressed at the CO or before the installer goes out to the installation site >>

<< briefly describe the various installation scenarios (such as installing first AP (or a pair of APs) and one or more HOUs, adding an HOU to an existing WPON provided by an AP, adding a Relay AP (and one or more HOUs) to an existing WPON provided by an AP), and adding a second AP (and one or more HOUs) to create an AP pair? Is it likely that an AP would be installed by itself without at least one HOU being installed at the same time? It certainly seems possible that just a single HOU could be installed by itself for a "late uptake" customer. This could perhaps be covered at a general level in the WPON Overview chapter, with any specific info about the AP here, with a reference to the WPON Overview chapter. >>

8.2   Scan the HOU identifier

<< Scan the HOU identifier, as the WPON (Wireless PON) wiki of Feb 06/18 indicates to do this before installing the HOU (this reports the serial number of the <<xx>> to the WPON manager) >> << need details on how to do this >>

8.3   Create and provision the HOU

<< Create and provision the HOU, through the WPON manager, as the WPON (Wireless PON) wiki of Feb 06/18 indicates to do this before installing the HOU >> << need details on how to do this >>

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8.4   AP installation information

If you will be installing any APs while you are installing the HOU, refer to the *AP Product Guide* for information about APs, including pre-installation steps and procedures on installing APs.

8.5   << placeholder in case needed >>

<< if needed, for any other pre-installation activities >>

9 Procedures to install an HOU

9.1 Purpose

This chapter provides the procedures to install an HOU.

9.2 General

<< need to determine what should go here or if this section is even needed >>

9.3 Prerequisites

You need the following items before beginning the installation:

- HOU
- Cat5 Ethernet cabling and the following connectors: << confirm >>
  - RJ-45 connector for connecting the cable to the HOU
  - connector suitable for connecting the cable to the CPE
- wall-mounting brackets and fasteners for the HOU << confirm >>
- silicon or other waterproof sealing/caulking compound << confirm >>
- mobile phone or tablet for local management of the HOU via Bluetooth
- << anything else? >>

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9.4   Recommended tools

You need the following tools for the installation:

- scanner for reading bar code on the HOU
- wire cutters and tools for attaching connectors to the Cat5 cabling
- something << what? >> for measuring distance << others?>> << note that the rest of the items in the list are from the G-241G-A ONT Product Guide and might not apply to an HOU installation >>
- #2 Phillips screwdriver
- 1/4 in. (6 mm) flat blade screwdriver
- wire strippers
- RJ-45 cable plug crimp tool
- voltmeter or multimeter
- drill and drill bits
- pin-in-hex screwdriver

9.5   Safety information

Read the following safety information before beginning the installation

<< need to confirm that the info in this section applies to the HOU, as it is from the G-241G-A Product Guide >>

<< include height/fall safety info (or is it not needed for HOU)?

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- do we need to add a reference to chapter 11 for grounding safety? >>

Danger 1 — Hazardous electrical voltages and currents can cause serious physical harm or death. Always use insulated tools and follow proper safety precautions when connecting or disconnecting power circuits.

Danger 2 — Make sure all sources of power are turned off and have no live voltages present on feed lines or terminals. Use a voltmeter to measure for voltage before proceeding.

Danger 3 — Always contact the local utility company before connecting the enclosure to the utilities.

Warning 1 — This equipment is ESD sensitive. Proper ESD protections should be used when removing the fiber access cover of the HOU.

<< does the HOU have an access cover? >>

Warning 2 — The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

Note 1 — Observe the local and national laws and regulations that may be applicable to this installation.

Note 2 — The HOU should be installed in accordance with the applicable requirements of the NEC or CEC. Local authorities and practices take precedent when there is conflict between the local standard and the NEC or CEC.

Note 3 — The HOU must be installed by qualified service personnel.

Note 4 — See HOU specifications in chapter 7 for the temperature ranges for the HOU.

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9.6   Identify the mounting site

<<intro needed >>

1   Identify the exact location for the HOU on an outside wall of the house; confirming that there is line of sight and there is less than 100 m (or is it 300 m?) between the prospective HOU location and planned or installed AP(s) (lines of sight will depend on the installation scenario, covered in section 8.1) << need details >> If possible, find a location below a window that can easily be accessed and worked on from within the house.

2   Confirm that the prospective HOU location is acceptable within the house, and that Cat5 cabling can be run inside the house from the CPE or prospective CPE location to the prospective HOU location.

3   STOP. This procedure is complete.

9.7   Make preparations at the mounting site

<< intro needed >>

1   Confirm that the CPE that the HOU is going to connect to is installed and powered up, or install and power up the CPE << need details >>

2   Connect the Cat5 cabling to the CPE (may need to attach a connector to the cabling first) and route the cable to the installation location for the HOU. The Cat5 cable must be routed inside the house to a point inside the house from the installation location and must have enough length to be able to pass through the wall to reach the HOU once it is mounted on the outside of the wall.

3   << is there a ground point on the HOU? If yes, then this step should be about making sure the far-end of the ground cable is attached to ground, presumably outside, and routing the ground cable to the installation location for the HOU - will need details >>

4   Scan the HOU if it was not done in section 8.2 (assuming that it is not too late if it was not already scanned)? << need details >>

5   Do any pre-work on the HOU and/or wall before mounting the HOU on the wall, esp since that actually mounting of the HOU could be high up and so it would be good to do what can be done while on the ground (such as attaching a mounting plate to the HOU) or before mounting the HOU (such as attaching a bracket to the wall) in order to minimize how many times the installer needs to go up the pole or on a ladder. << need details >>

6   STOP. This procedure is complete.

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9.8   Mount the HOU and make connections

<< need intro >> << Perhaps chapters 18 and 19 of the 7368 ISAM ONT Hardware and Cabling guide might have useful info >>

1   Drill a << what diameter? >> hole through the wall at the HOU location and thread the Cat5 cable through the hole (may need to attach connector to the cabling after threading) << need details >>

2   Connect ground to the HOU << need details >> << perhaps use info from chapter 6 in the 7368 ISAM ONT Hardware and Cabling guide >> << may need to trim to an appropriate length first >>

3   Connect the protruding end of the Cat5 cable to the HOU (may need to attach connector to the cabling) << need details >> << may need to trim to an appropriate length first >>

4   Mount the HOU (with attached ground and Cat5 cables) on the wall << need details >> << what about sealing around the HOU with silicon caulking etc and sealing the hole on the inside? >>

5   STOP. This procedure is complete.

9.9   Complete the installation

<< need intro >>

1   Power up the HOU by using the ON/OFF power switch. << add a figure showing location of switch? >>

2   Verify the HOU LED and voltage status << need details >> << are there applicable details in the *7368 Hardware and Cabling Installation Guide* that could be added here? >>

3   Verify system functionality of the HOU << assume that this can be done via Bluetooth (used with external app of mobile phone or tablet for local device management) >> << need details >> << configure anything on the HOU via Bluetooth >>

4   If the AP or APs for the HOU have been installed, check that the HOU has wireless connectivity with the AP and APs << need details >>

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5   If necessary, reset the HOU. << can the HOU be reset as described here? >>

    i   Locate the Reset button.

    ii   Insert the end of a straightened paper clip or other narrow object into the hole in the Reset button to reset the HOU.

6   STOP. This procedure is complete.

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10 Procedures to replace an HOU

10.1 Purpose

This chapter provides the procedures to replace an HOU. << work on this chapter after working on the installation chapter >>

10.2 General

<< is this section needed? >>

10.3 Prerequisites

<< work on this section after working on the installation chapter >>

10.4 Recommended tools

<< work on this chapter after working on the installation chapter >>

10.5 Safety information

<< work on this chapter after working on the installation chapter >>

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10.6   HOU replacement procedure

<< work on HOU replacement procedures after working on the HOU installation chapter >> << this procedure is currently the one for replacing the G-241G-A ONT and is left here for use as a model for the HOU >>

1   Deactivate the ONT services at the P-OLT.

If you are using the SLID feature, this step is not required. The ONT and the services can remain in service (IS).

i   Use the RTRV-ONT command to verify the ONT status and the associated services. Record the serial number or the SLID of the ONT displayed in the command output.

Example:

```
RTRV-ONT::ONT-1-1-1-1-1;
```

ii   If the ONT is in service, place the ONT in OOS state.

Example:

```
ED-ONT::ONT-1-1-1-1-1;
```

2   Power down the ONT unit by using the ON/OFF power switch.

3   Disconnect the video, POTS, Ethernet, power, and ground cables from the ONT; see Figure 13.

Figure 13   **G-241G-A ONT connections**

Ground lug   RF Video   POTS ports (RJ-14)   Gigabit Ethernet ports (RJ-45)   On/off button   Power connector   SC/APC connector
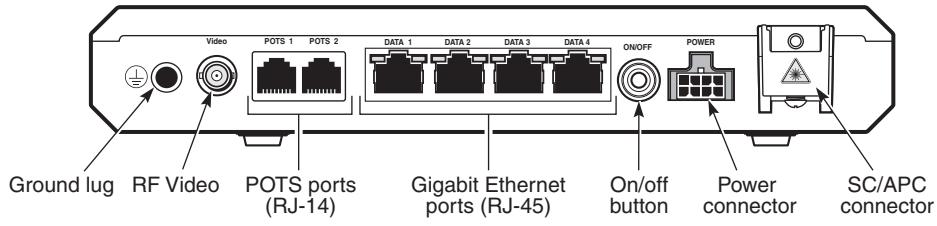
28061

4   Unplug the SC/APC fiber optic cable from the ONT.

i   Loosen the lock screw on the fiber optic connection clip.

ii   Lift the connection clip up.

iii   Unplug the fiber optic cable with SC/APC adapter from the fiber optic connector; see Figure 13.

iv   Lower the clip and tighten the lock screw.

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5   Replace the ONT with a new unit:

    a   On a flat surface, such as a desk, substitute a replacement ONT for the old ONT; go to step 8.

    b   On a wall. The G-241G-A can be wall-mounted with or without a fiber storage tray.

> **Note** — If the Emerson 24W AC/DC Power Adapter or the Delta DUPS-1232GA will be used, the ONT must be mounted a minimum of 31.5 in (0.8 m) above the floor.
>
> If the Delta DUPS-1232A will be used, the ONT must be mounted a minimum of 59 in (1.5 m) above the floor.

       i   Slide the old ONT upward and then away from the two mounting screws until the ONT is free of the wall.

      ii   Slide the wall mount keyholes on the ONT enclosure or fiber storage tray of the replacement ONT down over the mounting screws until it is securely seated.

    c   In a wall-mounted outdoor enclosure.

       i   Unfasten the G-241G-A ONT by turning the brackets to the open position and remove the unit; see Figure 14.

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Figure 14   **G-241G-A ONT mounted in an outdoor enclosure**
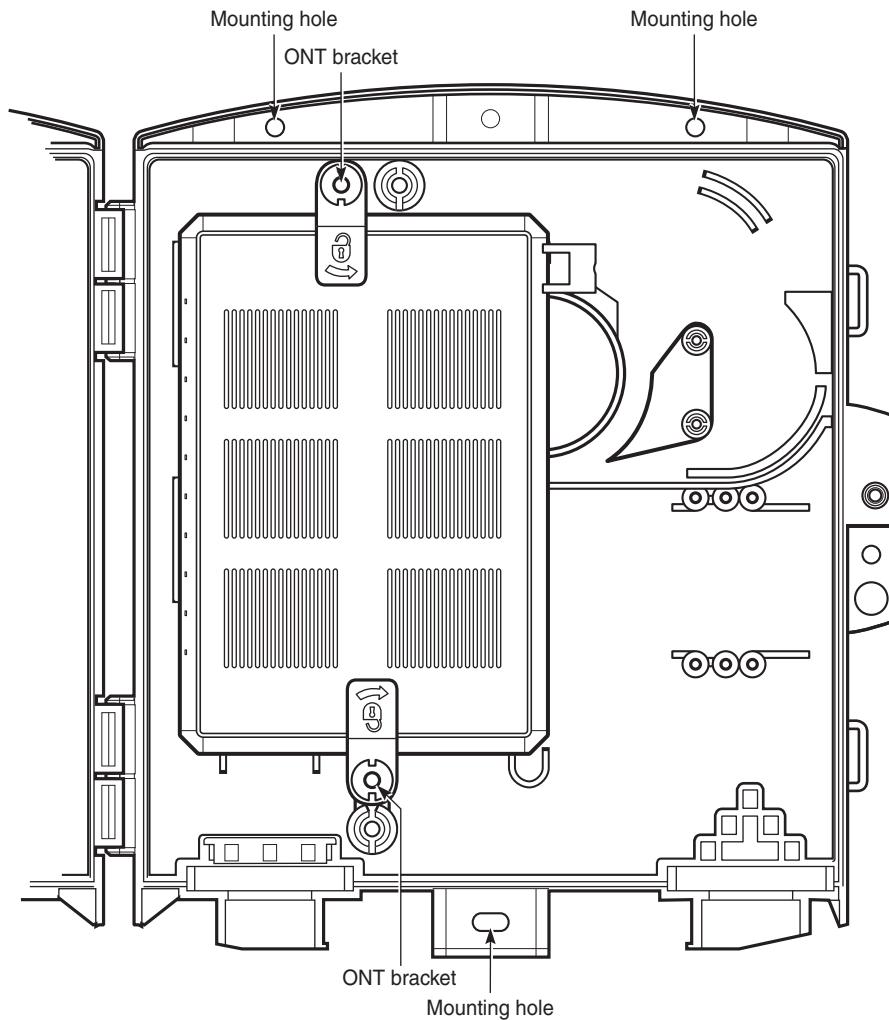
28068

ii   Position the replacement G-241G-A ONT within the outdoor enclosure and between the ONT brackets, as shown in Figure 14.

iii   Secure the G-241G-A ONT by turning the brackets to the closed position.

Warning — Do not overtighten the ONT bracket when securing the G-241G-A ONT to the outdoor enclosure. The unit can become skewed and compromise the environmental seal of the ONT mounted in the outdoor enclosure.

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6   To ground a G-241G-A ONT:

> **Danger 1 —** Hazardous electrical voltages and currents can cause serious physical harm or death. Always use insulated tools and follow proper safety precautions when connecting or disconnecting power circuits. For more information on grounding safety, see chapter 12.
>
> **Danger 2 —** Make sure all sources of power are turned off and have no live voltages present on feed lines or terminals. Use a voltmeter to measure for voltage before proceeding.
>
> **Danger 3 —** Always contact the local utility company before connecting the enclosure to the utilities.

    a   An indoor desktop or wall-mounted G-241G-A ONT is grounded by the 3-pin power adapter or a grounded UPS.

> **Warning —** Do not connect the ground lug of the G-241G-A ONT for indoor installations; the ONT is grounded by the power adapter or UPS.

    b   A G-241G-A ONT mounted in an outdoor enclosure must be grounded with a permanent ground wire.

       Connect a single #6 to #14 AWG ground wire to the recessed ground lug on the G-241G-A ONT. The ground wire exits from the back of the ONT unit in the same way as the cables.

7   Connect the RF video coaxial cable; see Figure 13.

8   Route up to four Ethernet cables to the RJ-45 ports, as shown in Figure 13. Connect the Ethernet cables.

9   Route up to two POTS cables to the RJ-14 ports, as shown in Figure 13. Connect the POTS cables.

10   If required, have approved service personnel who are trained to work with optic fiber clean the fiber optic connection. See the *7368 ISAM ONT Configuration, Management, and Troubleshooting Guide* for more information about fiber optic handling, inspection, and cleaning.

> **Danger —** Fiber optic cables transmit invisible laser light. To avoid eye damage or blindness, never look directly into fibers, connectors, or adapters.

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11   Connect the fiber optic cable to a G-241G-A ONT.

> **Warning —** Be careful to maintain a bend radius of no less than 1.5 inches (3.8 cm) when connecting the fiber optic cable. Too small of a bend radius in the cable can result in damage to the optic fiber.

   i   Route the fiber optic cable to the ONT.

   ii   Loosen the lock screw on the fiber optic connection clip.

   iii Lift the connection clip up.

   iv   Plug the fiber optic cable with SC/APC adapter into the fiber optic connector; see Figure 13.

   v   Lower the clip so that it secures the fiber optic cable.

   vi   Tighten the lock screw.

12   Install the power supply according to manufacturer specifications.

> **Warning —** Units must be powered by a Listed or CE approved and marked limited power source power supply with a minimum output rate of 12 V dc, 1.25 A.

13   Connect the power cable with an 8-pin Molex connector or 3-pin power adapter to the ONT unit.

14   For a G-241G-A ONT installed in an outdoor enclosure with an FSST, coil the excess cable in a clockwise direction allowing it to exit the lower right cable exit port.

> **Note —** Observe the following:
> - There must be approximately 18 in. (45.72 cm) of cable stub exiting the FSST at the right cable exit point.
> - The FSST stores a maximum of 75 ft (22.86 m) of cable.

15   Power up the ONT unit by using the ON/OFF power switch.

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16   If used, configure the SLID; see the *7368 ISAM ONT Configuration, Management, and Troubleshooting Guide*.

> **Note —** A new SLID or the old SLID may be used with the replacement ONT. If a new SLID is used, the new SLID must also be programmed at the P-OLT using TL1 or a network manager. If the old SLID is used, no changes need to be made at the P-OLT; see the operations and maintenance documentation for the OLT for more details.

17   If necessary, reset the ONT.

    i   Locate the Reset button.

    ii   Insert the end of a straightened paper clip or other narrow object into the hole in the Reset button to reset the ONT.

18   Verify the ONT LEDs, voltage status, and optical signal level; see the *7368 Hardware and Cabling Installation Guide*.

19   Activate and test the services; see the *7368 Hardware and Cabling Installation Guide*.

20   For a G-241G-A ONT installed in an outdoor enclosure, close the access cover of the outdoor enclosure and secure using the pin-in-hex screw.

21   STOP. This procedure is complete.

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11   Configure an HOU

11.1 Remote configuration

11.2 Local configuration

11.1   Remote configuration

The WPON manager and Nokia Altiplano can be used to configure an HOU remotely; see the *AP Product Guide* for more information about the WPON manager and Nokia Altiplano.

11.2   Local configuration

Local craft terminal access for an HOU is provided through a Bluetooth interface (classical Bluetooth, reach greater than 20 m) on the HOU.

The Bluetooth interface provides access to a Bluetooth server that can be used for local management of the HOU by a Bluetooth-equipped mobile phone or tablet or other external device.

You can configure the following through the Bluetooth interface of an HOU:

<< need info on how to configure the HOU through the Bluetooth interface >>

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12 Grounding safety

12.1 Ground safety information

12.1   Ground safety information

<< this section is based on the equivalent section in the G-241-G-A ONT product guide, with "ONT" changed to "HOU" - the section needs to be reviewed carefully to make sure that it is complete and accurate with respect to the HOU >>

Improper grounding can result in personal injury or equipment damage. See below for specific dangers and considerations when handling grounding equipment.

Danger — Hazardous electrical voltages and currents can cause serious physical harm or death. Always use insulated tools and follow proper safety precautions when connecting or disconnecting power circuits.

Danger — Make sure all sources of power are turned off and have no live voltages present on feed lines or terminals. Use a voltmeter to measure for voltage before proceeding.

Danger — Always contact the local utility company before connecting the enclosure to the utilities.

Danger — You must connect the HOU to earth ground before connecting the power supply to the HOU.

<< change "power supply" to "Cat5 cable that provides power over Ethernet"? >>

Danger — The earth bonding terminal shall be connected to an approved earth connection before the ac power is applied.

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Danger — Earthing and bonding of the HOU must comply with the ANSI-specific requirements found in NEC Article 250.

- Insulation - The grounding conductor must be insulated and listed as suitable for the purpose.
- Material - The grounding conductor shall be copper or other corrosion-resistant conductive material stranded or solid.
- Size - The grounding conductor must be a minimum of 14 AWG per UL investigation. If local code or regulations require more, follow per local codes or regulation.
- Length - The primary protector grounding conductor must be as short as practicable. In one- and two-family dwellings, the primary protector grounding conductor must be as short as practicable, not to exceed 20 ft (6.0 m) in length.
- If the building or structure served has no grounding means, as described in 800.100 (B)(1) or (B)(2)(1) of NEC Article 250, the communications grounding conductor must be connected to either of the following:

  a) to any one of the individual electrodes described in 250.52 (A)(1), (A)(2), (A)(3), or (A)(4).

  b) to an effectively grounded metal structure or to a ground rod or pipe not less than 5 ft (1.5 m) in length and 1/ 2 in. (12.7 mm) in diameter, driven, where practical, into permanently damp earth, and the communications ground rod shall be bonded to the power grounding electrode system in accordance with 800.100 (D).

Warning — This equipment is ESD sensitive. Proper ESD protection must be used when entering the TELCO Access portion of the HOU.

Warning — ANSI-specific: If using cable other than the recommended brands, select only UL-listed cable, rated for the specific installation.

Warning — ANSI-specific: If using cable other than the recommended brands, select only UL-listed cable, rated for the specific installation.
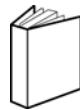
Note — Earthing and bonding of the HOU must comply with the ETSI-specific requirements found in local electrical wiring codes.

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Note — Observe all local and national laws and regulations that may be applicable to this installation.

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Customer document and product support

Customer documentation

Customer Documentation Welcome Page

Technical Support

Customer Documentation Technical Support

Documentation feedback

Customer Documentation Feedback

FCC Statement

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment .This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.