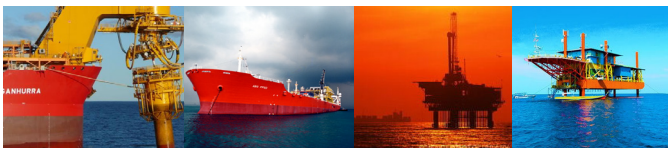# norphonic
Heavy Duty VoIP Telephones

Application Guide:
Maritime VoIP Communications for Oil & Gas, Ships and Offshore Facilities

This document will examine how Heavy Duty VoIP Telephones can help improve maritime communications in offshore locations such as Oil & Gas Rigs, Floating Production Storage Offloading (FPSO) ships, Cargo ships, Tankers, Bulk Carriers, Container ships, Passenger ships, Shipbuilding yards, Container Facilities, Machinery Monitoring Stations, Ports, Docks and other maritime areas. The document will also look at offshore IP networking issues that need to be evaluated when selecting industrial or emergency communications at sea including SIP (VoIP) offshore telephones, intrinsically safe / Ex and seawater resistant telephones.

Learn more about our Innovations at
www.norphonic.com

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1. Communications - A challenge for the Maritime industry

Maritime facilities, vessels, ships, oil & gas platforms / rigs are notorious for their harsh environments where conventional communications are neither available or economically feasible. Brutal offshore climate and environmental conditions combined with remote and isolated locations means that communication lifelines are increasingly important to manage the ongoing fleet and vessel operations as well as maintain crew and passenger safety.

Oil and gas CIOs, CTOS, communications managers, network engineers and IT teams need to implement secure, fast and reliable communications systems to monitor drilling activity, track production and provide a "ship-to-shore" communication to the corporate office onshore.

Beyond that, most ship operators have highlighted the importance of allowing crew to stay in contact with their family as a key contributor to a better quality of life on board. Offshore Communications are also frequently named as one of the key drivers of crew retention as crews have come to expect their level of connectivity to Facebook, Skype, their online banking, and Netflix movies to match what they have at home regardless of where they are stationed. An oil and gas exploration vessel in the North Atlantic Sea outside Norway and a large-scale luxury liner crossing the Caribbean Ocean may be very different creatures, but they share a common need for vessel-to-land connectivity to transport VoIP voice and data traffic rapidly and reliably.

Each seagoing vessel - whether it is a large container ship, an oil tanker, or a luxury passenger liner – is dealing with many of the same communication challenges that any land-based organisation will be familiar with. The various segments – from commercial shipping, fishing industries and cruise liners, to naval and offshore oil and gas businesses – are looking at improving communications, from emergency telephones, providing employees with a better working environment, and utilising new applications that will help the business to run more profitably.

Finding the right maritime VoIP communications solutions for your vessel, with adequate bandwidth within budget, is therefore no small feat.

2. "Must-Have" Offshore Communications

High-performance marine communications is critical to keep remote offshore offices connected with decision makers around the clock.

Industrial and explosion proof telephones are often "Must-Have" communication devices on board oil & gas rigs, Floating Production Storage Offloading (FPSO) ships, cargo ships, tankers, bulk carriers, container ships, cruise and passenger ships.

Emergency telephones, often referred to as a SOS telephones or Emergency Callboxes, are used in emergency situations offshore to notify a central control room about a fire, evacuation, entrapment or to issue Standard Marine Communication Phrases (SMCP). SMCP is a set of key phrases in the English language (which is the internationally recognised language of the sea), supported by the international community for use at sea and developed by the International Maritime Organization (IMO). An example of a SMCP could be the message: "I have developed stability problems, heavy icing. Request ice breaker assistance", or "I am sinking. Please proceed to my assistance. What is your ETA at our distress position?".

The importance of effective onboard communications was highlighted to the world in 2010, when the Deepwater Horizon oil spill happened in the Mexico gulf outside of the USA. At a critical time when offshore vessels, coast guard & rescue services needed to communicate effectively together, many onboard emergency telephones were found not to be working. This resulted in a focus to improve maritime communications onboard ships and offshore oil & gas rigs by investing in the latest marine VoIP Telephones. This initiative is a joint affort from both governmental emergency response teams, service providers, Oil & Gas rig owners and operators.

In summary, to maintain communications in emergency situations at sea, whether it is accidents, sudden illness, personal injury or other emergency situations, it is critical to invest in dependable and rugged VoIP telephones in your offshore environment.

3. High Performance Marine VoIP Telephones

Norphonic is a Norwegian company that specialise in the production of high performance communications for offshore and marine areas. Being located in the seaport of Bergen on Norway's west coast, the company has a long history of delivering Heavy Duty VoIP telephones into some of the world's most challenging areas, ensuring essential voice communications when it is most needed.

The Norphonic Offshore SIP-based Telephone is an industrial /maritime communications unit that is both seawater resistant and weather proof to IP65. This marine Ethernet telephone is extremely robust and the hookswitch has no moving parts, making it able to operate in industrial dirty or exposed marine areas where icing, dust or grime quickly can become a problem.

In the remaining part this article we shall look at some of the issues that needs to be addressed when selecting an effective VoIP / SIP telephone solution in your maritime communications needs offshore.

4. VoIP Telephones & Offshore Fiber Networks

As with all major modern day industrial networks, there is a shift happening in Maritime Industry towards implementing modern fiber / Ethernet networks. In previous years, the industry typically viewed cruise or ship Ethernet networks as "IT infrastructure" and saw this primarily as a cost center. However, today rugged and heavy duty VoIP telephones represent a highly cost effective way for rig & ship owners to future-proof their fiber network for expansion using open standards whilst improving their offshore communications.

Ship owners with multiple ships in different geographic locations need the ability to communicate between offices in a cost effective way, and traditionally calls over the PSTN and GSM networks could easily ramp up heavy monthly bills.

5. Reduce monthly bills by routing calls over the internet

A benefit with the Norphonic Offshore VoIP Telephone is that it is based on open SIP standards. This means that you can use the Norphonic SIP function and transfer the calls to any IP PBX free of charge over the internet.

Using open standards also means that the Norphonic solution is extremely cost effective when it comes to future maintenance and repairs. -You can easily swap out the Norphonic SIP phone or PBX at a later date, without having to worry about being tied to certain phone or switch products via propritary protocols. Session Initiation Protocol (SIP) is the most widely used protocol for controlling multimedia communication sessions such as voice and video calls over Internet Protocol (IP). For example, if you need to change from an Alcatel solution to a Cisco PBX solution or telephones at a later date, you can do this without having to worry if you need to change out any other infrastructure.

In addition, by Norphonic maritime VoIP telephones, there are cost savings to be gained from remote system monitoring, fault checks and automatic reporting.

Next page: Ship to Shore Communications…

6. Ship to Shore Communications

Norphonic units communicate over an industrial Ethernet. The flexibility of Ethernet network topology allows a ship network to be configured to provide the level of fault tolerance required of the application.

Below is an example on how Norphonic maritime VoIP telephones can be used to make ship-to-shore calls on board oil & gas rigs, Floating Production Storage Offloading (FPSO) ships, cargo ships, tankers, bulk carriers, container ships, passenger ships etc.
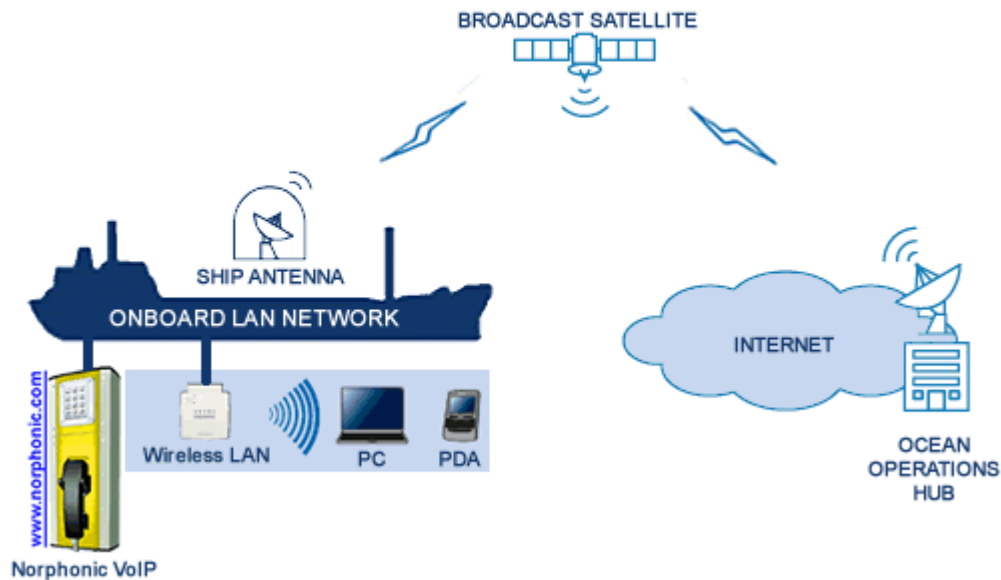
Fig.1. The image shows how the Norphonic Marine VoIP telephone can be connected to the Antenna via a Ku Band Satellite, providing Internet access 24/7 through an onshore operations Hub station.

7. Offshore LAN / VoIP Network

On board the ship, Norphonic units can operate effectively on a range of network topologies via single mode fiber cables or wireless connections. The simplest option is a star network configuration with all modules radiating out from a single switch. At the other extreme is a fully managed redundant ring network, where any single point of failure can be managed through an alternate pathway.

The Norphonic IP Emergency Roadside Telephone comes with an option to include two built-in single mode fiber optic ports (LC Connectors) which enables redundant networking via Rapid Spanning Tree Protocol (RSTP). This means that you do not need an external fiber switch to enable redundancy, which is a highly cost effective inclusion. The phone could also be used in a network with external switches, and the phone would then be connected to the switch via Ethernet (RJ45) port on the Norphonic maritime VoIP telephone unit.

7.1 Example - Offshore LAN / VoIP Network

The below figure shows how the telephones could be installed in a ring-formation to provide a high degree of redundancy in case of failure of either the fiber link or the phone itself.

Example: Redundant VoIP Network
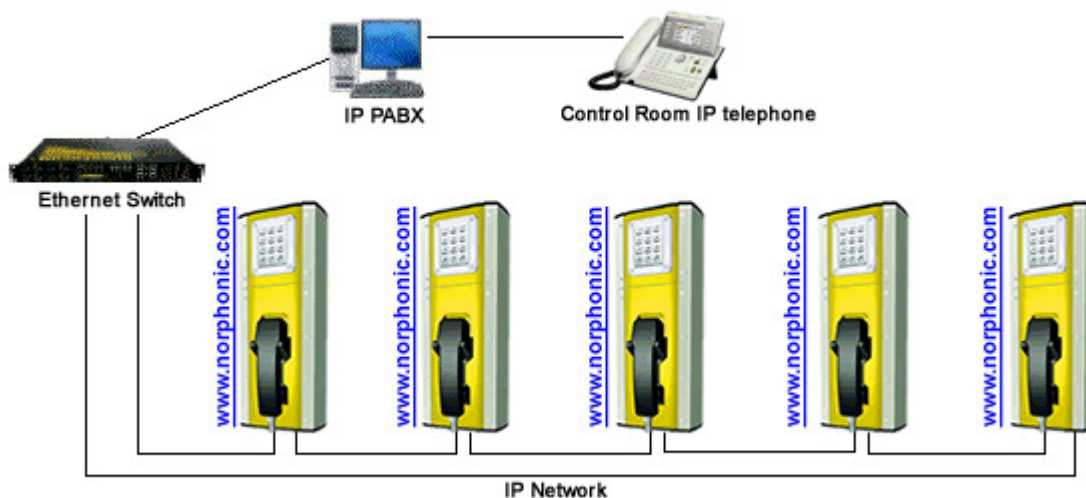
(Norphonic has two optional integrated single mode 100Mbit type LC connectors for redundant networking - RSTP)

Fig 2. A redundant VoIP Network using Norphonic's integrated single mode fiber ports.

Explanation of Network Redundancy / above fig.

Since the Norphonic sea-proof telephones can be equipped with 2 fiber ports as a product option, a break in the fiber link in one direction will not affect the phone, since the system will reconfigure to the alternate path. And if one of the telephone is faulty, it will not affect the other phones from functioning.

In many modern ship / offshore networks, it is required that the offshore network shall be made to be redundant, immune against noise and built on open standard protocols. This is achieved by use of Ethernet over fiber, usually coupled in a ring formation with a protocol which controls the ring. Of open protocols, typical alternatives include Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP) and Multiple Spanning Tree Protocol (MSTP).

Norphonic onboard VoIP telephones support RSTP and STP. Today, STP is rarely used, so in practical terms RSTP is the main protocol which is used. Seeing that almost all administration switches today support RSTP, this means that you can construct network rings where you can mix and match different Ethernet switches from different manufacturers, and you can also be free to select whatever switch you want when you are upgrading or maintaining your network. Norphonic does not support proprietary solutions, as we cannot see that a customer will have any benefit by being bound to only one product. This means that you secure a high degree of future proofing when investing in a Norphonic Maritime VoIP Telephone solution.

The Norphonic VoIP Telephones are otherwise built on Open Standard SIP (Session Initiation Protocol) which is the most widely used VoIP Signalling protocol and RTP (Real Time Protocol) which is the most widely used Audio protocol on VoIP networks. This further establish the Norphonic unit as the telephone of choice when it comes to future-proofing your overall maritime communications solution.

8. Offshore Wireless Communications

When designing a wireless network offshore, it is important to have a basic understanding of radio receivers/transmitters and the modulation and coding used to convey information in existing and emerging communications systems. This can include the latest generation of receivers, transmitters and modulation systems used in mobile radio, microwave, satellite WiFi, WiMAX, HSPA and LTE and other OFDMA/ FDMA/TDMA systems. It is also important to plan well when implementing offshore wireless networks, as some equipment on board the ship can pick up and reflect signals.

Although the Norphonic VoIP offshore telephones are typically interconnected to the Ethernet network using fiber cables, Norphonic IP telephones can also be connected to an external WiFi tranceiver / antenna in order to transmit and receive signals, thereby providing a Wireless solution for Offshore / Marine areas. See the example schematic below.

Example: Wireless Emergency / Industrial Telephone Solution

Fig 3: Example of a Norphonic telephone connected to a multi-directional transceiver / antenna to facilitate Wireless / WiFi communication in offshore / maritime areas, on board ships etc.

The flexibility of the Norphonic VoIP Marine Telephones therefore means that it can either be used on a fixed fiber cable layout or in a wireless VoIP environment. There are no particular barriers to installing Wireless / WiFi solutions, but the network designer should be aware of potential voice quality pit-falls and plan for these.

9. Noise Reduction and Voice Quality

Passengers and crew have a certain voice quality expectation when conducting a telephone conversation. This expectation is no different when using offshore VoIP telephones compared to using their fixed line telephone at home / onshore.

Some key things to be aware of in terms of voice quality when designing your ship network layout:

- **Latency** - delay from data is transmitted until it is received. Noticable in conversations if latency goes above 100ms.

- **Jitter** - variances in latency between packets. High jitter means large variance in packet latency and degrades speech quality

- **Out of order datapackets** - degrades speech quality, is often caused by jitter

The offshore network designer should be careful to specify a VoIP Telephone which gives a good sound quality, by ensuring that the telephone incorporates the following:

- **Quality of Service (QoS)** is a feature found in all Norphonic VoIP marine telephones and refers to the ability to provide different priority of voice and data flows, or to guarantee a certain level of performance to a data flow, ensuring impeccable delivery of voice communications in an IP network.

- **Type of Service (ToS)** is a feature found in all Norphonic VoIP marine telephones, delivering packet precedence (i.e., priority) in network traffic, thereby ensuring low delay, high throughput and high reliability.

10. Measuring Voice Quality - Mean Opinion Score (MOS)

Mean Opinion Score (MOS) is a metric calculation which is used to measure call / voice quality. The MOS score of a call is measured numerically between 1 (for unusable) and 5 (for excellent). VOIP calls that are working properly fall between 3.5 and 4.2 MOS. A score of 4.0 is defined as toll quality. MOS score is an indication of what users would think about the call. It was developed using surveys of users of different technologies, but today it is calculated through the use of engineering formulas.

When designing industrial or offshore IP networks to carry voice, you should not allow the MOS to drop below 3.0 at any time. For most emergency network applications, a MOS above 3.7 is recommended at all times. The Norphonic Heavy Duty VoIP Telephone can boost a high MOS listening quality score of 4.3.

11. Remote Management and Control

As the Offshore VoIP Telephone installations are geographically dispersed and the number of remote users changes over time, the need to manage and support vital VoIP devices from afar becomes crucial.

With Norphonic rugged maritime VoIP telephones, operators the central operations hub can configure, monitor and even trouble-shoot Norphonic telephones from a remote location. This functionality is highly useful for oil & gas rigs, Floating Production Storage Offloading (FPSO) ships, cargo ships, tankers, bulk carriers, container ships, cruise and passenger ships. This web-browser solution is very easy-to-use and has been designed to provide the ship operator or rig owner with complete control.

In terms of start-up configuration, Norphonic sea-proof telephones can also be comissioned from a remote location. The telephones can be configured either via Web interface or via configuration files. In case of the latter, a configuration file for each phone is placed on a TFTP server, and upon boot-up, phones retrieve the configuration. If the TFTP server is not accessible (e.g. removed after initial site configuration), telephones use the settings downloaded previously.

All configuration and firmware updates can be done remotely over the network, including re-starting telephones. Firmware update is performed by placing an update bundle on TFTP server. The phones on the installation detect new firmware and perform the upgrade within 24 hours, with normal distribution in the time frame.

This avoids peak loads on the network, avoids RSTP tree deterioration due to mass reboots of equipment, and ensures that only a fraction of the telephone park will be down at any given moment. This is a great benefit for the end user regarding ensuring optimal Mean Time Between Failure records (MTBF).

11.1. Self-Monitoring and Fault Check Functions

To further reduce maintenance costs and improve overall system uptime, Norphonic offers automatic health-checks and fault sensing on all offshore models. This valuable feature gives the ship operator an immediate notification if there is a connectivity or function fault with the Norphonic unit, thereby ensuring timely repair and maintenance of your maritime communications system. This beneficial function offer surveillance capabilities of:

• Hook sensing (ie: hook off/on)
• Audio Self Test (microphone / headset check)
• Fiberport 1 status (link check)
• Fiberport 2 status (link check)
• RJ 45 port status (link check)
• Firmware version and firmware update status

The audio self-test involves testing the function of the SIP software, audio circuits and the handset by playing and recognizing a set of DTMF tones in the handset at pre-configured time intervals. The alarms are reported over the fiberoptic or cat5 Ethernet (where applicable).

The phone can provide Modbus UDP, Modbus TCP or SNMP traps for the self test and on-hook / off-hook event. Fiber link failure does not generate a trap but it can be polled. The advantage of using SNMP or Modbus protocols is that these are standardised tools for monitoring other network equipment, including switches, routers, PBX systems, VoIP gateways and pretty much anything you want to monitor inside an offshore environment.

11.2. SCADA or Business Process Management Integration

The inclusion of Modbus TCP, UDP and SNMP open standard protocols in all Norphonic VoIP models mean that it easy to integrate Norphonic offshore telephones with your existing ship SCADA system or overall data reporting system.

Norphonic Heavy Duty VoIP Telephones can therefore easily integrate with existing IT infrastructure surch as business process management, SCADA systems or land based control equipment. This provides unique flexibility when integrating process-reported alarms.

12. What to look for in a VoIP Offshore Telephone?

There are many issues that needs to be addressed prior to commissioning an IP sea-proof telephone, such as evaluating the installation environment, functionality and temperature ranges. Below are some key pointers to look at when choosing your VoIP Offshore Telephone:

• Is the system future proof? Can the system be upgraded or changed in the future without having to change all the telephones and the entire network? All Norphonic Heavy Duty telephones can be changed with other systems without loss or differentiation to the level of service.

• Is the telephone dust and water proof? Offshore and maritime areas are some of the most challenging areas in the world, exposed to extreme levels of dust and water. The ingress IP rating to IP65 is therefore recommended in all offshore applications. See definition of Ingress Protection in the below Glossary for further information.

• Is the telephone seawater resistant? All Norphonic VoIP telephones are high performance products which are coated with a protective solution paint, making it resistant to corrosion from the seawater.

• Is the telephone condensation proof? –This can otherwise lead to severe problems in operation as water can easily form inside the unit, affecting performance. All Norphonic telephones are immune to condensation effects.

• Does the hookswitch contain moving parts? All Norphonic Heavy Duty VoIP telephones do not contain moving parts, and can therefore operate in extreme areas where dust or exposure to grime is a challenge for traditional telephone systems.

- Can the system work in extreme temperatures? Offshore environments can be notoriously hot and/or cold, so a wide operating temperature functionality is recommended for offshore telephones, from –20 up to +55 Celcius.

- Does the telephone incorporate VSQ - Voice Sound Quality? This is a standard feature in all Norphonic telephone systems, ensuring loud and clear sound, even in noisy ambiance areas.

- Does the VoIP telephone incorporate a QoS – Quality of Service functionality and ToS – Type of Service? These features, found in all Norphonic telephones, guarantees a certain level of performance in a data flow, ensuring impeccable delivery of voice communications in an IP Network.

- Is the telephone colored in such a way that it is easily identified by users? The Norphonic Heavy Duty VoIP comes in a bright yellow color as standard. Colours can also be customised depending on the user needs and order volumes.

- Is the system easy to install and to maintain? Norphonic Heavy Duty VoIP telephones are easy to install and have in-built status monitoring and fault check functions. This means that the status of the telephones can be monitored from a remote location, saving you considerable maintenance costs.

- Can the onboard communications technology easily be integrated with the existing land-based corporate IT infrastructure? Norphonic Heavy Duty VoIP systems are built on Open Standard SIP technology & Open Standard Modbus TCP / UDP technology, and can therefore be integrated with your existing IT infrastructure, SCADA systems or any IP based PBX and network system (including Alcatel, Cisco, Asterisk, Switchvox, Broadsoft etc).

- Is the telephone CE approved? CE marking means that the product is certified to meet EU consumer safety, health or environmental requirements. End users should be aware that some telephones use the intentionally confusing term "CE" for "China Export", and the only way consumers can check this is to closely examine the CE mark/ logo as the two logos are very similar.

- Need an Ex approved telephone? It is important to realise that not all oil & gas locations actually need EX or explosion proof telephones. This depend on whether or not your area is exposed to EX gases, vapour or other hazardous elements. In the cases where EX telephones are needed, is the EX telephone approved to the right standards? In Europe, the ATEX directive consists of two EU (European Union) directives describing what equipment and work environment is allowed in an environment with an explosive atmosphere. ATEX derives its name from the French title of the 94/9/EC directive: "Appareils destinés à être utilisés en ATmosphères EXplosibles".

    Oil & Gas & related ship owners must follow the directives to protect employees from explosion risk in areas with an explosive atmosphere and also classify areas where hazardous explosive atmospheres may occur into zones. The classification given to a particular zone, and its size and location, depends on the likelihood of an explosive atmosphere occurring and its persistence if it does.

    In other geographies like USA, MSHA (Mine Safety Association) has spesifications on explosion proof phones, and different approval bodies can issue different approval certificates. For example Underwriters Laboratories (UL) and Factory Mutual (FM) issue approvals in the USA, and Canadian Standards Association (CSA) issue approvals for Canada. In other words, if you need EX products, it is important that you check what approvals is needed in your region, and follow local regulations on this important safety aspect, all the time keeping also in mind that not all Offshore Locations actually require EX products. Make sure you check this before you buy. An EX telephone will be more expensive than a "regular" industrial VoIP telephone.

13. Contact Info - Maritime Communications Technology

The maritime sector is a diverse one which includes commercial shipping, fishing industries, leisure shipping and cruise, naval, as well as multinational oil and gas industries. The degree to which the shipping and maritime industry can improve communications and reduce costs to depends on how well they exploit the full communication capabilities of industrial VoIP Ethernet products including rugged VoIP Telephones.

To meet growing demands for reliable and cost-effective communications, Norphonic is offering its Heavy Duty VoIP Telephones for offshore and maritime areas. Norphonic is a highly affordable maritime VoIP telephone which is able to operate in harsh offshore environments.

You can read more about Norphonic and access case studies, white papers and technical product information online at www.norphonic.com

We also encourage you to get in touch to find out more about Norphonic VoIP Maritime Telephones. Please contact us at:

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15. Glossary of Terms:

Access Control Telephone
Often used as a part of a larger Access Control system to communicate with a central control room at door entrance points and access gates.

Armoured Stainless Steel Cord
Vandal proof telephone cord

ATEX Telephone / Eex Telephone / Ex Tele
The ATEX directive consists of two EU (European Union) directives describing what equipment and work environment is allowed in an environment with an explosive atmosphere. ATEX derives its name from the French title of the 94/9/EC directive: "Appareils destinés à être utilisés en ATmosphères EXplosibles". As of July 2006, organisations in EU must follow the directives to protect employees from explosion risk in areas with an explosive atmosphere. Employers must classify areas where hazardous explosive atmospheres may occur into zones. The classification given to a particular zone, and its size and location, depends on the likelihood of an explosive atmosphere occurring and its persistence if it does. The aim of directive 94/9/EC is to allow the free trade of 'ATEX' equipment and protective systems within the EU by removing the need for separate testing and documentation for each member state. See the ATEX Directive for further information.

Autodial on handset lift
The telephone will automatically dial a number when the handset is lifted, thereby eliminating the need for the user to remember a telephone number when in distress.

BPDU
Bridge Protocol Data Unit. Data packets which are sent from STP, RSTP and MSTP switches to share information about the switches.

Braille
The Braille system is a method that is widely used by blind people to read and write, invented by Luis Braille in 1822 and used on many telephone keypads worldwide

CE mark / CE approved Telephone
CE approval / marking means that the product is certified to meet EU consumer safety, health or environmental requirements. End users should be aware that some telephones use the intentionally confusing term "CE" for "China Export", and the only way consumers can check this is to closely examine the CE mark/ logo as the two logos are very similar.

Door Telephone
Used to communicate with a central control room to facilitate the control and access to closed sites such as utility power factories

Elevator Telephone
Used to call for help in case of emergencies including entrapment or fire.

Emergency Roadside Call System (ERCS)
See definitions under "ERT -Emergency Roadside Telephone" and "Emergency Telephone"

Emergency Roadside Telephone (ERT)
Emergency Roadside Telephones (ERT) are typically used in "SOS" Call Boxes alongside public highways, inside tunnels and on bridges. Norphonic Emergency Roadside Telephones (ERT) are often referred to as: RET - Roadside Emergency Telephone, RT - Roadside Telephone, ERCS - Emergency Roadside Call System or ETS - Emergency Telephone System.

Emergency Telephone
Often referred to as a SOS telephone or Emergency Callbox. This is a common generic term for a telephone which is used in emergency situations, to notify a central control room about a fire, evacuation or entrapment. Emergency Telephones are often used in places where people may feel vulnerable or unsafe at night, such as University Campuses, Underground Car Parking Facilities, Public Swimming Pools or along the Coastline where the public may wish to report swimmers or boats in danger at sea.

Emergency Telephone System (ETS)
See definitions under "ERT -Emergency Roadside Telephone" and "Emergency Telephone"

Ex Telephone / Eex Telephone
An "EX telephone" is a general term for a telephone that is approved to be used in potentially explosive areas or environments also known as "unsafe areas" (including Gas refineries, Oil rigs or deep coal mines) where a combination with sufficient oxygen and fuel in gas, mist, vapor or dust form, can cause an explosion. Methane, hydrogen or coal dust are examples of possible fuels. See also relevant definitions under "ATEX Telephone" and "Unsafe Area" and "intrinsically safe"

FPSO
Floating Production Storage Offloading (FPSO) - a term used on the Norphonic website to describe the vessels used to store and offload oil & gas.

Heavy Duty Telephone
Generic term for industrial and emergency telephones used in challenging environments. For example telephones that that are exposed to high levels of air humidity, dust, vibration, shock, extreme temperatures, rain, seawater or attempted vandalism. Heavy duty telephones is used in many applications including transport, offshore, production floors, chemical processing sites, mines, transit tunnels, university campuses and other public places.

Industrial Telephone
General term for a telephone used in challenging areas, for example production floors, wind turbines, machinery or other industrial environments

Intrinsically Safe Telephone
Intrinsically Safe Telephones are telephones that are approved for use in chemical plants, refineries, coal mines, grain elevators and any other environment where volatile gases and dust are a major consideration.

IP Rating / **Ingress Protection Rating** /
The IP rating classifies the degrees of protection provided against the intrusion of solid objects, dust, accidental contact, and water in electrical enclosures. The standard aims to provide users more detailed information than vague marketing terms such as "waterproof". The standard consists of the letters IP followed by two digits and an optional letter: for example, the Norphonic Heavy Duty VoIP telephone have been approved to the highest rating against dust "dust proof" (6) and can be sprayed with water by a water jet from any direction without any harmful effects (5). Therefore, in this case, the Norphonic Heavy Duty VoIP telephone has a rating of "IP65".

Jitter
Jitter is a term used in VoIP data communications and refers to variances in latency between data packets. High jitter means large variance in packet latency and degrades speech quality. See also Latency, QoS (Quality of Service), ToS (Type of Service), MOS (mean opinion score) and Out of order data packets.

LAN - Local Area Network
A LAN connects network devices over a relatively short distance. A networked office building, school, or home usually contains a single LAN, though sometimes one building will contain a few small LANs (perhaps one per room), and occasionally a LAN will span a group of nearby buildings. In addition to operating in a limited space, LANs are also typically owned, controlled, and managed by a single person or organization.

Latency
Latency is a term used in connection with VoIP signals or data packets. It refers to the delay from when data is transmitted until it is received. This Latency is noticable in conversations if latency goes above 100ms. See also QoS (Quality of Service), ToS (Type of Service), MOS (mean opinion score), Jitter and Out of order data packets.

Leaky Feeder
A leaky feeder is a communications system used in underground offshore and other tunnel environments. It consists of a coaxial cable running along the tunnels which emits and receives radio waves. The cable is leaky in that it has gaps or slots in its outer conductor to allow signal to leak into or out of the cable along its entire length. Because of this leakage of signal, line amplifiers are required to be inserted at regular intervals, typically every 350 to 500 meters, to boost the signal back up to acceptable levels.

Level Crossing Telephone
Used for emergency calls or information access at platforms and railway crossings

Maritime VoIP Telephones
See definitions under "Offshore Telephones", "Sea-proof Telephones" and "VoIP".

Mining Telephone / **Mining Phone**
Generic term describing a robust heavy duty telephone used in sub-surface mining applications. Typically, mining telephones need to be dust and waterproof (See Ingress Protection) and resistant to condensation and corrosion effects. Mining telephones also need to be able operate in extreme temperatures.

Modbus UDP / **Modbus TCP**
Modbus is a serial communications protocol published by Modicon in 1979 for use with its programmable logic controllers (PLCs). It has become a de facto standard communications protocol in industry, and is now the most commonly available means of connecting industrial electronic devices. Modbus is a standard feature found in all Norphonic Heavy Duty Telephones and refers to the Modbus UDP and Modbus TCP open protocols which enables remote access for status monitoring and control. Examples of telephone status monitoring include: link status, condition of telephone components, microphone check, etc.

MOS
Numerical measure of the perceived audio quality of a telephone connection. The MOS is expressed as a single number in the range 1 to 5, where 1 is lowest perceived audio quality, and 5 is the highest perceived audio quality

MSHA
"MSHA" is the abbreviation for the US-based "Mine Safety and Health Administration" which is the Federal enforcement agency responsible for the health and safety of miners working in the United States of America. The related term "MSHA Approval" relates to MSHA's Approval and Certification Center which approves and certifies certain mining products for use in underground coal and gassy underground metal mines. See also the related listings under ATEX Telephone, EX Telephone.

MSTP
Multiple Spanning Tree Protocol

Noise Reduction
Process of reducing noise in a communications signal.

Norphonic
A leading manufacturer of heavy duty VoIP telephones that are used in a wide variety of applications worldwide, including offshore facilities, maritime areas, transport (air, sea, road, rail), industry, mining, public places and emergency areas.

Norphonic Heavy Duty VoIP Telephone
The Norphonic Heavy Duty VoIP Telephone is a robust, weather resistant telephone built to withstand extreme temperatures, humid and dirty environments.

Norphonic Monitoring
"Norphonic Monitoring" is a software program which delivers all of the features that are necessary for administrators to access, view, control, manage and modify remote Norphonic Heavy Duty VoIP Telephones from a central web-browser interface. Norphonic Monitoring is a total solution for integrated control and monitoring of your Norphonic Heavy Duty VoIP Telephone system.

Offshore Telephone
Typically used to describe a rugged telephone which is waterproof & immune to corrosion by seawater. See also sea-proof telephone.

OLE
Object Linking and Embedding

OSPF
OSPF stands for Open Shortest Path First. OSPF is a dynamic routing protocol.

Out of order datapackets
Out of order datapackets - a term used in VoIP voice communications and refers to incidents which degrades speech quality, is often caused by jitter. (see also Jitter)

Outdoor Telephone
Used in public places such at at train terminals, car parks, university campuses, at bridges, alongside public beaches and other public places

PA/VA Telephone
Public Address / Voice Alarm telephone is used as part of a larger PA/VA system to transfer voice, data and/or images to a Central Station

PABX / PBX / EPABX
A private automatic branch exchange (PABX) is a telephone exchange that serves a particular business or office, as opposed to one that a common carrier or telephone company operates the general public

PABX hotline / Hot-line
Describes the feature where a hotline is immediately connected when the handset is lifted.

Platform Telephone / Station
Used by operators to convey information at metro, underground or railway stations and/or platforms

Point to Point Communication Telephone
Used to communicate between two points, often installed in large lifting machinery, cranes, underground mines and wind power systems. Usually, point to point communication telephones are hooked up directly with each other, eliminating the need to go through a private automatic business exchange (PABX) or a common telephone carrier.

PSTN
The Public Switched Telephone Network (PSTN) is the network of the world's public circuit-switched telephone networks, in much the same way that the Internet is the network of the world's public IP-based packet-switched networks. Originally a network of fixed-line analog telephone systems, the PSTN is now almost entirely digital and includes mobile as well as fixed telephones.

Public Emergency Telephone / SOS Telephone
Used in places where people may feel vulnerable or unsafe at night, such as University Campuses, Underground Car Parking Facilities, Public Swimming Pools or along the Coastline where the public may wish to report swimmers or boats in danger at sea.

Public Information Telephone
Used in ”call-for-assistance” type applications, for example in large shopping centres, airports, car parks or transport terminals

QoS
Quality of Service (QoS) is a feature found in all Norphonic telephones and refers to the ability to provide different priority of voice and data flows, or to guarantee a certain level of performance to a data flow, ensuring impeccable delivery of voice communications in an IP network.

Refuge Bay Telephone
Refuge Bays usually refers to specifically constructed underground evacuation rooms in mining environments. These rooms usually contain an emergency telephone system as well as drinks, foods and medical supplies for miners in case of emergency evacuation. Refuge bays can also be found in other underground tunnel environments, including road and train tunnels.

RIO
Remote Input Output. Device for control of digital input and digital outputs.

RoHS Compliant Telephone
"RoHS compliant" means that the product is tested against, and does NOT contain: lead, mercury, cadmium, hexavalent chromium, poly-brominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

RSTP
Rapid Spanning Tree Protocol is a faster variant of "STP", which is a protocol implemented in switches to stop logical loops of data.

RTP
Real Time Protocol

Safe Area
Typically refers to an area which is safe from explosions or areas that do not contain ignitable gases, fumes or substances. Safe areas typically do not need explosion proof telephones (see also "ATEX Telephone / Eex Telephone / Ex Tele").

SCADA
SCADA stands for "Supervisory Control and Data Acquisition" system. It generally refers to industrial control systems: computer systems that monitor and control industrial, infrastructure, or facility-based processes. In the telephone-world, the SCADA system would be used to control and manage the telephones (communication failure, off-hook sensing, alarm handling etc).

Sea-proof Telephone
The term Sea-proof telephone is usually used to describe a rugged telephone unit which is immune to seawater and waterproof. Typically used onboard vessels, oil rigs and other maritime areas. See also IP / Ingress Protection.

Seawater Resistant Telephone
Telephones that are resistant to corrosion from seawater, often metal coated with a protective solution paint

Self Monitoring and Fault Check
A feature in Norphonic telephones, allowing the telephone to carry out automatic health-check and fault sensing and communicate this, thereby improving uptime and performance whilst reducing maintenance work

Service Telephone
Used by service engineers and maintenance personnel to communicate with a central control room

Signal Telephone / Trackside Telephone
Used at railway signal stations and along railway tracks

SIP
Session Initiation Protocol (SIP) is an IETF-defined signaling protocol, which is the most widely used protocol for controlling multimedia communication sessions such as voice and video calls over Internet Protocol (IP).

SMCP
Standard Marine Communication Phrases (SMCP) is a set of key phrases in the English language (which is the internationally recognised language of the sea), supported by the international community for use at sea and developed by The International Maritime Organization (IMO). An example of SMCP is the message: "I have developed stability problems, heavy icing. Request ice breaker assistance".

SNMP
Simple Network Management Protocol, is used in network management systems to monitor network-attached devices for conditions that warrant administrative attention.

SOS Telephone / SOS Callbox
See definition under "Emergency Telephone".

STP
Spanning Tree Protocol, a slower form of RSTP / see definition under "RSTP"

ToS
Type of Service (ToS) is a feature found in all Norphonic telephones, delivering packet precedence (i.e., priority) in network traffic, thereby ensuring low delay, high throughput and high reliability.

Unsafe Area
Typically refers to an area which is unsafe when it comes to potential explosions or areas that contain easily ignitable gases, fumes or substances. Examples include oil rigs, deep coal mines and petrochemical production environments. See also "ATEX Telephone / Eex Telephone / Ex Tele".

Vandal Proof Telephone
Vandal proof telephone is a generic term describing a robust heavy duty telephone handset, cord or telephone casing that is resistant to vandalism or sabotage attempts. Telephones placed in public areas are often prone to vandalism and therefore need to feature a vandal proof cord, keypad and/or handset.

VLAN
Virtual Local Area Networks

Voice Sound Quality (VSQ)
Voice Sound Quality (VSQ) is an unique feature found in Norphonic telephones, treating the sound so that it is heard extremely clearly even in noisy ambient areas.

VoIP
Voice over Internet Protocol is a general term for delivery of voice communications (voice, facsimile and voice-messaging applications) over an IP network, rather than the public switched telephone network (PSTN). Other related terms frequently encountered and synonymous with VoIP are IP telephony, Internet telephony, voice over broadband (VoBB), broadband telephony, broadband telephone and SIP telephone (see separate definition of SIP- Session Initiation Protocol".

VRRP
VRRP stands for "Virtual Router Redundancy Protocol" and is a protocol that enables two routers to share one common IP address. If the master router fails, then the slave router will inherit the IP address.

WAN - Wide Area Network
As the term implies, a WAN spans a large physical distance. The Internet is the largest WAN, spanning the Earth. A WAN is a geographically-dispersed collection of LANs (see LAN -Local Area Network). A network device called a router connects LANs to a WAN. In IP networking, the router maintains both a LAN address and a WAN address. A WAN differs from a LAN in several important ways. Most WANs (like the Internet) are not owned by any one organization but rather exist under collective or distributed ownership and management.

Water proof telephone
A generic term for a telephone which is resistant to water ingress. See also "IP Rating / Ingress Protection Rating".

Weather proof telephone
A generic term for a telephone which can handle extreme temperature ranges and bad weather. See also "IP Rating / Ingress Protection Rating".

WLAN - Wireless Local Area Network
A Wireless Local Area Network is a LAN (see "Local Area Network") based on WiFi wireless network technology