BROWSING, SURFING & SAILING

INTERNET ON BOARD

GLOMEX®

The best in marine antennas

weBoat® 4G Plus

COASTAL INTERNET SYSTEM

You are never alone on the water

GLOMEX®
The best in marine antennas

THE MOST COMPLETE RANGE OF INNOVATIVE PRODUCTS

GLOMEASY
COAXIAL CABLES
COASTAL INTERNET
CB
MOUNTS
TERRESTRIAL TV
INTERNET
SATELLITE TV
AM/FM
VHF
ORBCOMM
WiFi
EXTENSIONS
WEBBOAT
GROUND PLATES
HF/SSB
AIS
BRACKETS

YOU ARE NEVER ALONE ON THE WATER

Printed in Italy – April 2016

Glomex antennas - from left to right: 2.4m/8' High performing VHF antenna (RA1225), weBBoat 4G Plus (the Dual Sim Coastal Internet antenna system), Rhea (47cm/18,5'' DVB-S2 Satellite TV antenna), Altair (Full HD DVB-T2 TV antenna) and 2,4m/8' AM-FM radio antenna (RA1288)

WHAT IS WEBBOAT?

Today, advancements in technology allow us to stay connected to the world, our friends and family, and to our interests while on the go. Although these technologies are readily available and easy to use, sometimes location can cause loss of connectivity such as on the water.
Thanks to the super-fast 3G/4G/Wi-Fi built-in router, internet connectivity can be retained while boating whenever and where ever you go.
The weBBoat was developed to help with these issues while withstanding the harsh marine environment while enjoying our time on the water. Social networking, video streaming, chatting, and email can all be done approximately 20 miles from shore*.
The weBBoat is a Coastal Internet system with **automatic firmware updates** and **automatic App updates** so you always have the best performance without any need to contact technicians. With the factory service functionality, weBBoat 4G Plus directly communicates with Glomex for any problems

(*Note: Depending on conditions).

WHAT DOES WEBBOAT DO?

There are many factors that can cause disruption to either the cellular or Wi-Fi network while you are underway such as the size of your phones' internal antenna, boat layout, antenna placement, humidity, time of season, etc. Thanks to the advanced technology used, the WeBBoat can help prevent or solve these connection problems. Using twin high-gain antennas, and high-speed data transfer protocols, the WeBBoat is by far the most advanced antenna system in the market today! Mounting the antenna as high as possible on the vessel ensures maxim range and coverage stability for your internet connection. Using the advanced switching software, allows the user to save money on costly roaming and overage charges by automatically switching to Wi-Fi when available.

WEBBOAT 4G PLUS

COASTAL INTERNET ANTENNAS

weBBoat® 4G Plus

3G / 4G / WI-FI COASTAL INTERNET ANTENNA SYSTEM WITH DUAL SIM
code: IT1004PLUS

Use your iPhone®, Smartphone and PC at sea, up to approximately **20 miles** from the coast!

Weigth: 1,2 kg (2,65 lb)

WEBBOAT 4G PLUS APP ON:

Download on the App Store

Google play

Sail Boat

Power Boat

Big Yacht

MAIN FEATURES

- **Dual Sim operation**: Allows for multi-carrier and multi-data use capabilities. If one card runs out of data, the other can be used. If signal strength is weak for one carrier, the other carrier can be used.
- WeBBoat ®plus app: **Extended functionality** such as switching between Sims and switching Wi-FI to cellular data are just a few control features that the WeBBoat app can do for you. Available for iOS and Android devices.
- Four diversity, **high-gain antennas** for 4G are incorporated to allow for maximum cellular coverage without degradation to the system.
- **Two high-gain Wi-Fi antennas** are also employed to provide maximum reception capability from local hot-spot signals.
- The **super-fast 4G/3G/Wi-Fi router** specifically developed for the marine environment allows for up to 32 different devices to be connected at the same time.
- The WeBBoat® has a built-in switching system that **automatically switch from 4G to Wi-Fi** to limit data costs as well as SIM cards which can reduce on data and roaming cellular costs.
- **PLUG AND PLAY** functionality - you just need a 10/30 Vdc power supply cable
- **Free firmware updates**
- **Free periodic app updates**
- Factory **Service Functionality**
- In LTE mode, speeds can be as high as 100 Mbps on download and 50 Mbps on upload. (Speed dependent on data plan, coverage, and distance).
- Quad-band operation (UMTS, GSM, 3G, 4G/LTE).
- Three Ethernet ports.
- 4G backup WAN capability.
- 10-30 vDC, 200mA max power consumption
- Free updates via Glomex website.
- IEEE 802.11b,g,n compliant
- Wireless approvals and Certifications: CE, FCC

WEBBOAT 4G PLUS APP

COASTAL INTERNET ANTENNAS

WEBBOAT APP TO EASILY MANAGE AND CONFIGURATE THE weBoat 4G Plus

1

MENU

2

SIM 1

3

SIM 2

4

WIFI

5

AUTOSWITCH

WEBBOAT 4G PLUS APP

6

AUTOMATIC FIRMWARE UPGRADE

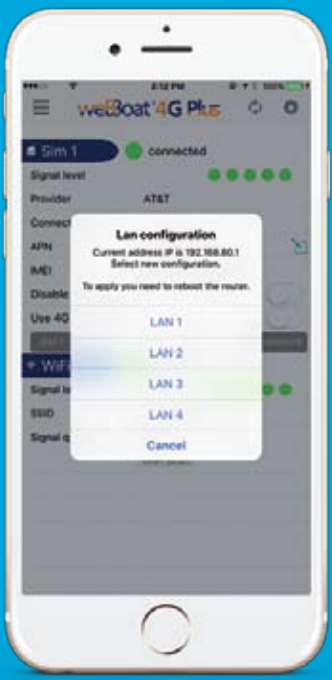
7

CHANGE PASSWORD

8

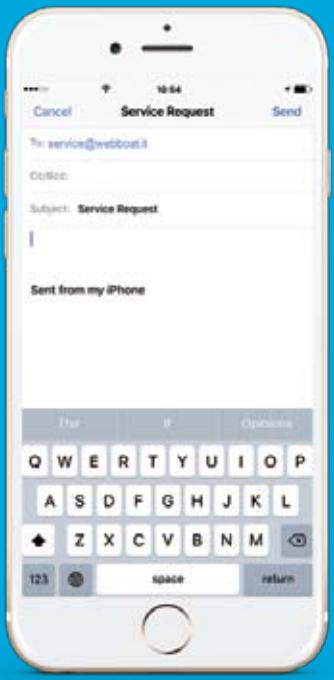
OPTIONS

9



IP CONFIGURATION

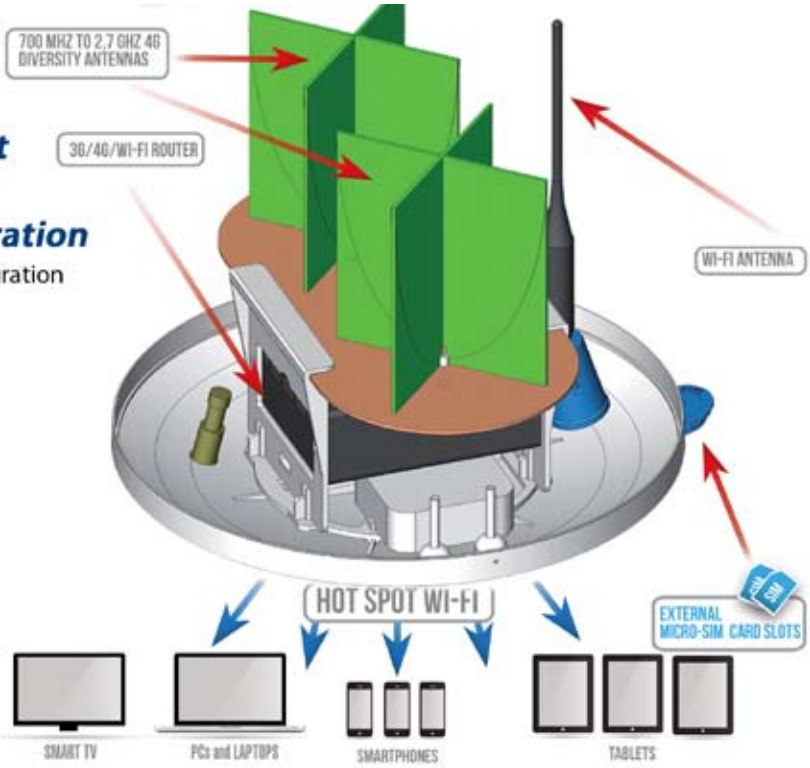
10



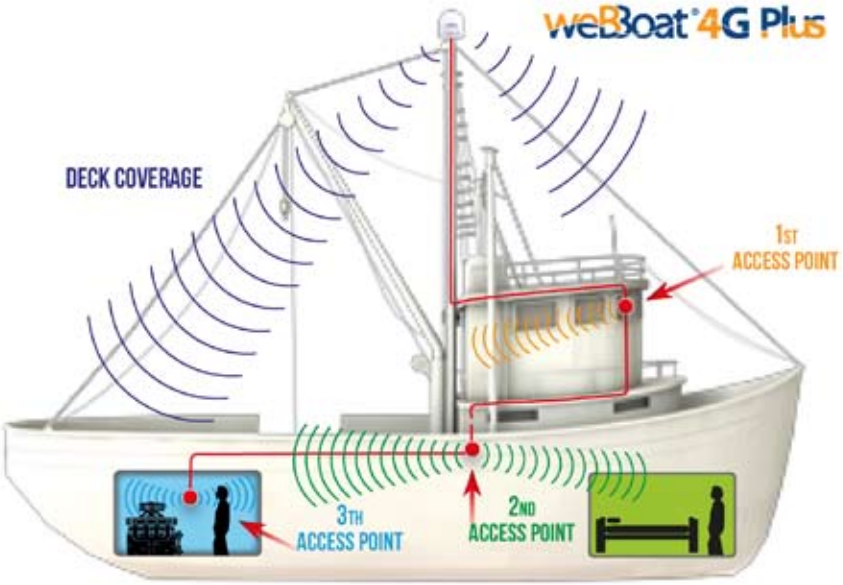
SERVICE

weBBoat 4G Plus configuration

Basic configuration

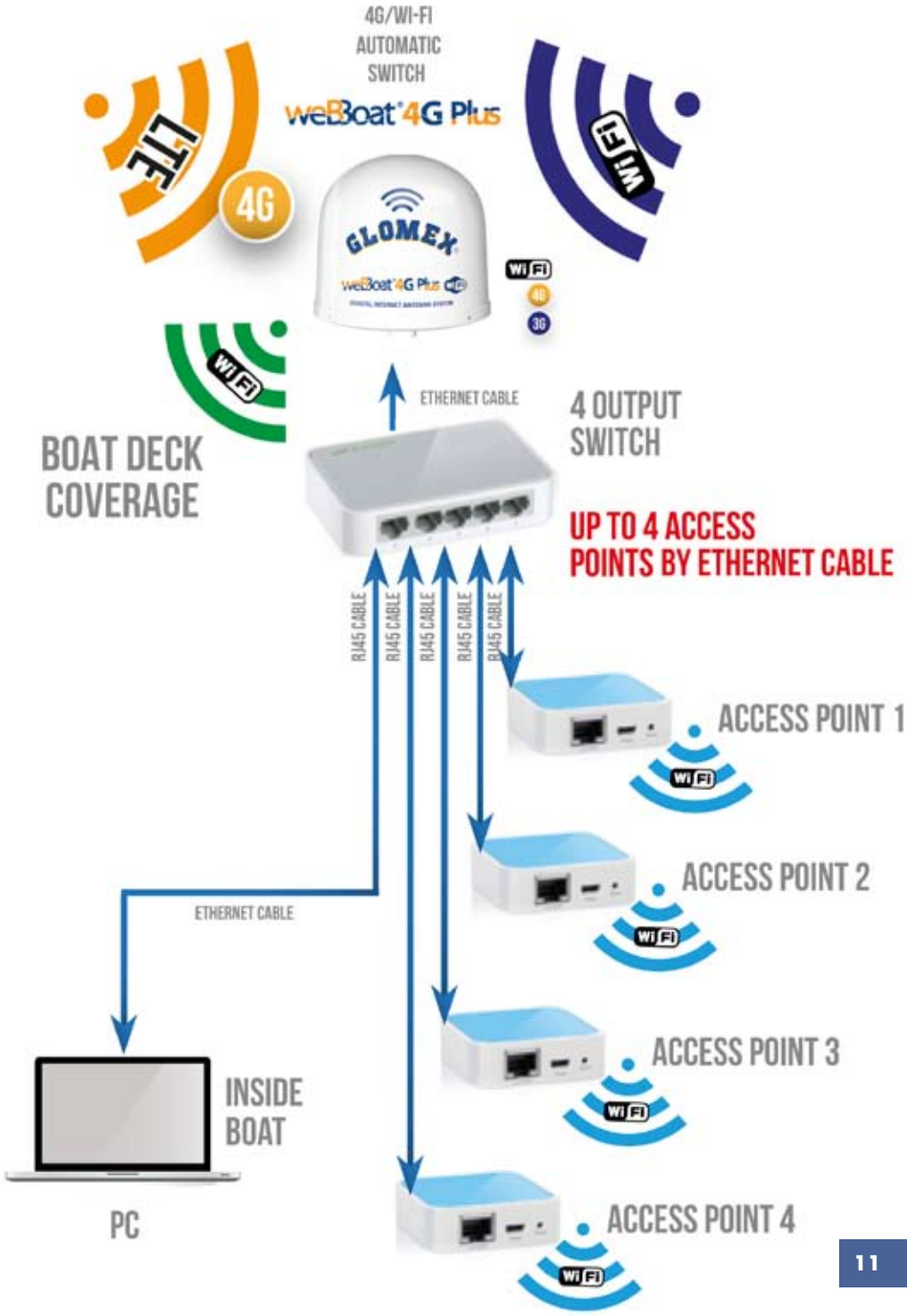


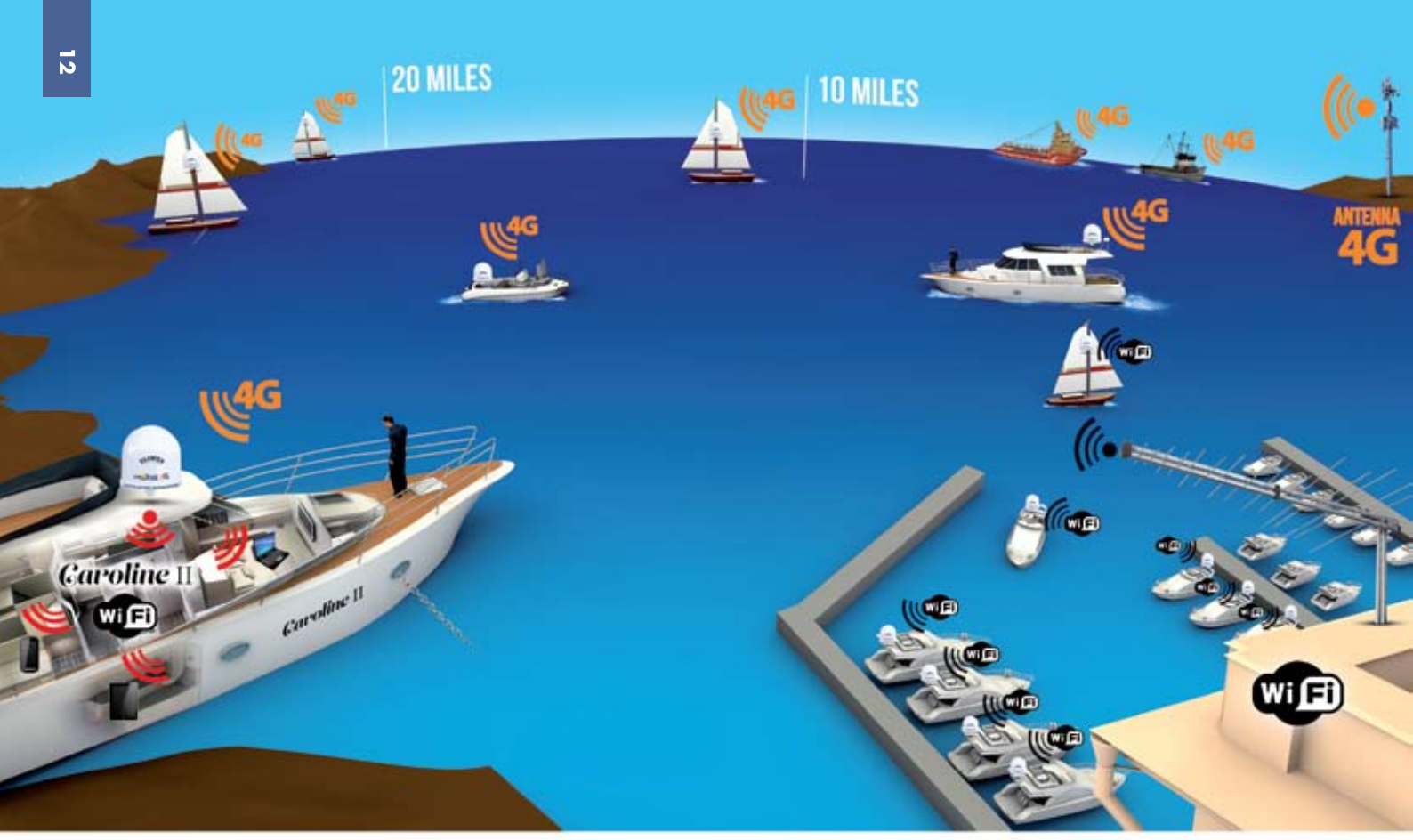
When you need to cover larger metal boats, you will need to change the system as follows:



USE UP TO 4 ACCESS POINTS

WEBBOAT 4G PLUS EXTENDED SYSTEM





weBoat® 4G Plus

4G 2G
3G UMTS GPRS

SMARTPHONE - TABLET - COMPUTER

SOCIAL NETWORK AND MAIL

ADVANCED BAND SHARING CAPABILITY

Unlike most marine based 4G system routers, the weBBoat 4G Plus Wi-Fi modem has the ability to accommodate up to 32 different devices without sacrificing performance or speed where others are usually limited to less than 15 devices. This is accomplished by using two separate radios which allow for more simultaneous connections without tasking the ISP. The weBBoat 4G Plus also uses the latest hardware and firmware standards to ensure reliable connection with the fastest speed and longest range available. To complete the system, four diversity antennas are employed to maximize performance and range making the weBBoat 4G Plus the most advanced internet marine device in the market.

E.U. 4G LTE FREQUENCIES AND BANDS

LTE FDD BANDS	B1/B2/B3/B5/B7/B8/B20
DC- HSPA+/HASPA+/HSPA/UMTS	850/900/1900/2100 MHz
GSM/GPRS/EDGE	800/850/1800/1900 MHz

U.S. 4G LTE FREQUENCIES AND BANDS FREQUENCIES BY CARRIER IN MHz

CARRIER	NETWORK	3G BANDS	3G FREQUENCIES	4G LTE BANDS	4G LTE FREQUENCIES	
AT&T	GSM/UMTS/HSPA+	2, 5	1900, 850	2, 4, 12, 17	1900, 1700 abcde, 700 bc	Totally GSM Compatible
T-MOBILE	GSM/UMTS/HSPA+	2, 4	1900, 1700/2100	2, 4, 12	1900, 1700 def, 700 a	Totally GSM Compatible
VERIZON	CDMA	0, 1	850, 1900	2, 4, 13	1900, 1700 f, 700 c	
SPRINT	CDMA	10, 1	800, 1900	25, 26, 41	1900 g, 850, 2500	
US CELLULAR	CDMA	0, 1	850, 1900	5, 12	850, 700 ab	

SUBJECTED TO CHANGE WITHOUT NOTICE

WEBBOAT 4G 2

COASTAL INTERNET ANTENNAS

weBBoat 4G2 CLOUD EDITION

YOUR DIGITAL SAILOR

WEBBOAT 4G PLUS BECOMES SMARTER WITH GLOMEX OPERATIVE SYSTEM (GL-OS)

The next generation of boat monitoring and communication is here! The weBBoat 4G2 is able to monitor all aspects of your boat anywhere and at anytime and send automatic alert notifications to your smartphone if there are any changes on your boat. Thanks to the revolutionary micro-pc contained in the unit and multiple boat sensors, you now can have peace of mind knowing that your vessel is safe and secure.

AVAILABLE IN 2 VERSIONS

AVAILABLE SOON

model: IT1005

BASIC

BUILT-IN MICRO PC

weBBoat 4Gz2 monitors some basic sensors installed on the boat such as GPS, humidity, temperature and barometric pressure.

POWERED BY GL-OS

Barometric Pressure · Temperature · Humidity · GPS

BUILT-IN MICRO PC + GLOMEX SMART INTERFACE

ADVANCED

With the Glomex Smart Interface, you can have additional services that allow you to monitor any useful aspect of the boat such as: water in the bilge sensor, battery level, sea conditions, security sensor with the video surveillance etc...*

POWERED BY GL-OS

model: IT1005

+

GLOMEX SMART INTERFACE (BLACK BOX)
ITGSI

** plus many more sensors, equipment, multimedia devices, navigation, and communication.*

Intrusion Alarm · Battery Sensor · Water in the Bilge · Sea condition Sensor · Weather Station · Barometric Pressure · Temperature · Humidity · GPS

NEW

IRIDIUM OPTION

weBBoat 4G 2 can be connected to the IRIDIUM SYSTEM to send alert notifications to your smartphone even with no 4G/3G or WiFi network

code: IT1005

+

Glomex Smart Interface (black box)
code: ITGSI

+

IRIDIUM SYSTEM

AVAILABLE SOON

Welcome to the next generation of communication and connectivity! The ***weBBoat 4G 2*** is the first of its kind in the marine industry. This 3G/4G/Wi-Fi coastal internet system has intergrated monitoring systems as well as the ability to surf the internet up to approximately 20 miles from shore. Glomex has developed two distinct features in this new system that incorporate the cloud (**Glomex cloud**) and a new operating system (Glomex Operative System **GL-OS**) which provide useful monitoring services that can be controlled from anywhere thanks to the Glomex App (available for iOS and Android devices). With its powerful built-in Micro-PC, the system monitors many sensors on the boat such as battery levels, bilge sensors, security sensors, and even video surveillance. If there are any changes to these sensors, the system alerts you with push notifications to your smartphone immediately. This is done by using the marina's Wi-Fi to which the ***weBBoat 4G 2*** is connected or through the 3G/4G network of the ***weBBoat 4G 2*** SIM card (SIM cards not included).

The ***weBBoat 4G 2*** is sold as two models. The "Basic" version can monitor the following sensors: GPS, humidity, temperature, and barometric pressure. The "Advanced" version monitors the same sensors but also includes the **Glomex Smart Interface** (model ITGSI). This black box is installed inside the vessel and is connected to the ***weBBoat 4G 2*** through the on-board Wi-Fi network which avoids additional wiring. The Glomex Smart Interface monitors bilge sensors, battery levels, sea conditions, security sensors, and video surveillance. In addition to monitoring the vessel, all of this information can be connected to multiple services that constantly evolve and are always available through the ***weBBoat 4G 2*** and the Glomex Cloud. Creating a digital logbook, you can also share your life at sea on social networks. What makes this system even more special is that as more sensors become available, the system can be upgraded and expanded for even more applications. **For added security, you can also add an optional IRIDIUM module that can send the alert notifications to your smartphone even if there is no 3G/4G or Wi-Fi signal.**

weBBoat 4G PRO - model IT1004PRO

The new weBBoat 4G PRO is a 4G/3G/Wi-Fi integrated Internet antenna system that packs some amazing features like a high performing 4G router, dual 4G/3G diversity antenna arrays, and two micro SIM card slots.
The weBBoat 4G PRO can also be integrated with other network devices as well as with other Glomex commercial Wi-Fi antennas like the PRA471 or PRA473EXT for larger vessel coverage.

weBBoat 4G PRO

Commercial 3G, 4G & Wi-Fi DUAL SIM internet router with two diversity antenna systems

NEW

KEY POINTS

2 x 3dBi ultra wideband antennas in Diversity mode

Extremely rugged mechanical components to withstand the harsh marine environments

High performing 3G/4G router specifically developed for professional use

Equipped with an external receptacle for 2 MICRO-SIM cards to surf the internet on 3G/4G

You can share the connection inside of the boat by various systems including the access point or boat network; this allows you to connect any type of devices to the internet.

Developed with appropriate materials for withstanding harsh marine environmental conditions

It can be connected to an access point or a switch with an Ethernet cable to have a Wi-Fi hotspot inside the vessel.

It can be matched with two different external high performing 12 dBi gain Wi-Fi antennas (PRA471 or PRA473EXT) that allow you to have a high speed wireless internet connection throughout your boat and Wi-Fi land access point in a very quick and easy way

GLOMEX PROmarine 5 YEARS WARRANTY

AVAILABLE FOR

- Megayacht
- Merchant ship
- Tanker
- Cargo
- Barge
- Supply vessel
- Fishing boat
- Platform

Wi Fi

3G

4G

DUAL SIM

MICRO SIM MICRO SIM

Inside the ASA radome there are two 4G diversity wideband antennas and a 3G/4G router for the best internet connection on your vessel

350mm (14")

300mm (12") Ø

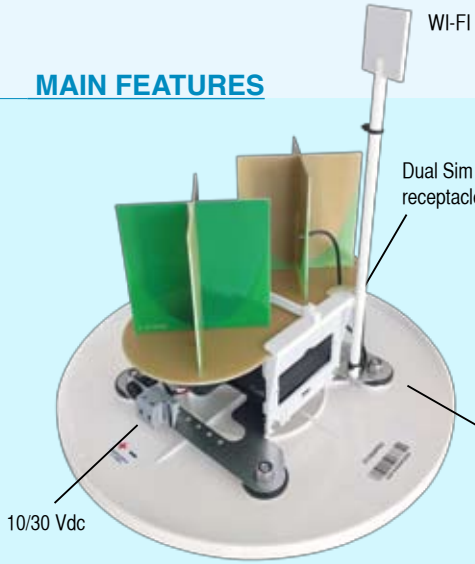
WEBBOAT 4G PRO

4G / 3G MODEM	Glomex
4G/3G ANTENNA	2 X 3dBi ultra wide band antenna in diversity mode
FREQUENCY	4G (LTE): 800, 850, 900, 1800, 1900, 2100, 2600 MHz (B1/B2/B3/B5/B7/B8/B20) UMTS, HSDPA, HSUPA, HSPA+, DC-HSPA+: 850, 900, 1900, 2100MHz GSM, GPRS, EDGE: 850, 900, 1800, 1900 MHz
WI-FI FREQUENCY RANGE	2.4 – 2.5 GHz
BANDWIDTH 4G/LTE	Download: up to 100Mbps (CAT3) Upload: up to 50 Mbps
BANDWIDTH 3G/UMTS	Download: up to 42Mbps Upload: up to 5.76Mbps
SIM INTERFACE	1 x Standard SIM Slot
LAN INTERFACE	3 x 10/100MMbps LAN Ports (Auto MDI-X, Auto-Negotiation)
POLARIZATION	Vertical
WIFI FREQUENCY	IEEE 802.11b (11 Mbps) IEEE 802.11g (54 Mbps) IEEE 802.11n (150 Mbps)

GENERAL SPECIFICATIONS

RADOME MATERIAL	ASA anti UV
RADOME WEIGHT	2,2 kg (4,9lb)
RADOME DIMENSIONS	300mm (12") Ø 350mm (14") H
POWER SUPPLY	24 Vdc
OPERATING TEMPERATURE	-20°C ~ +70°C
OPERATING TEMPERATURE	-20°C / 50°C
STORANGE HUMIDITY	5% ~ 95% non condensing
WIND RATING	60 m/s

MAIN FEATURES



REINFORCED STAINLESS STEEL PLATFORM WITH SHOCK RESISTANT CLOSURE AND HOUSING

SIMPLE YET POWERFUL USER INTERFACE WITH ADVANCED CONFIGURATIONS ALLOWING TOTAL CUSTOMIZATION

Not included ACCESSORIES

ITAP001
150Mbps Wireless N Nano Router Access point

ITSW001
5-Port 10/100Mbps Desktop Switch

ITNCB100
100 m (328') RJ45 Ethernet cable – Ethernet connectors not included

ITNCP001
Crymp-tipe Ethernet male connector for RJ45 cable

ITCCR001
Professional crimping tool for RJ45 cable

PRA473EXT - 1,4 m (4,6')

This commercial grade Wi-Fi antenna system was designed to meet and exceed the most extreme marine conditions without sacrificing performance. The 12dBi antenna is perfectly matched to the powerful and rugged integrated transmitter. This combination will allow you to attach to your local hotspots at the marina, harbor, resort, or wherever your travels may take you.
The system is truly expandable and can be connected with other network devices or access points to create additional hotspots on the boat allowing for even more stability, coverage, and device connectivity.

PRA473EXT

Wi-Fi Omni-Directional Antenna System

NEW

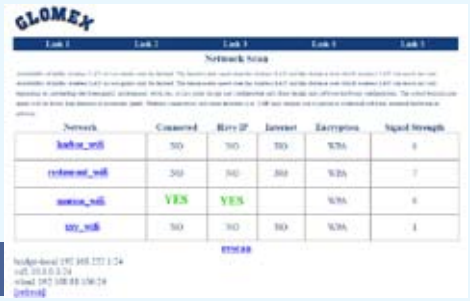
- 12 dBi gain antenna
- Single wi-fi omnidirectional antenna - 2.4 GHz
- Integrated transmitter
- POE supplied
- Easy mounting using 1"BSP mounts (not included)
- Termination: RJ45 10/100 base T Ethernet IEEE802,3
- Vertically polarized, vibration proof, lightweight, corrosion resistant antenna
- The antenna brass elements are protected by high quality and rugged fibreglass tube
- Developed with appropriate materials for withstanding harsh marine environmental conditions

AVAILABLE FOR

- Megayacht
- Merchant ship
- Tanker
- Cargo
- Barge
- Supply vessel
- Fishing boat

PLUG & PLAY

EASY TO USE PC INTERFACE FOR QUICK CONNECTION



LED signal indicators

Available mounting thread:
1" BSP x 11 tpi or
1"x14 tpi UNS

MECHANICAL SPECIFICATIONS

LENGTH	1,4 m (4,6')
WEIGHT	1,833kg (4,04 lb)
INSTALLATION	1"BSP x 11 tpi
TEMPERATURE RANGE	-40 / +60 °C
WIND RATING	60 m/s
COLOUR	white
MATERIAL	Fibreglass tube + stainless steel ferrule
MOUNTING	see below

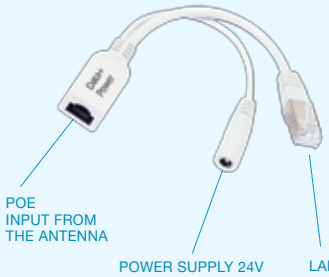
ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE	2,4 - 2,5 GHz
POWER SUPPLY	24 V DC feed through connector (POE)
GAIN	12 dBi
POLARIZATION	Vertical
TERMINATION	RJ45 10/100 base T Ethernet IEEE802,3

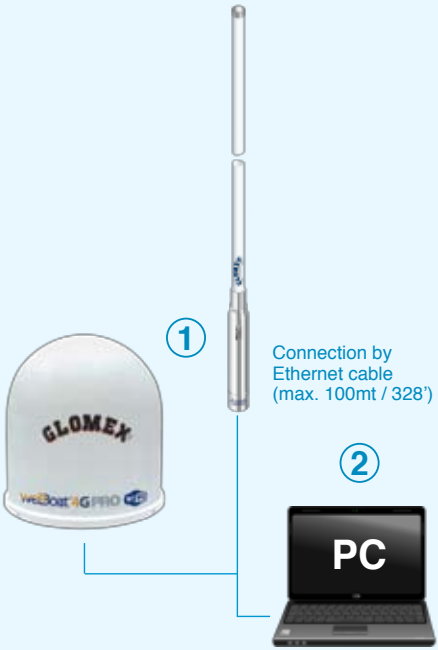
WI-FI ANTENNA WITH INTEGRATED TRANSMITTER

The customer must configure the antenna transmitter in accordance with National regulations

POE INJECTOR



2 INSTALLATION EXAMPLES



Connection by Ethernet cable (max. 100mt / 328')

GLOMEX
PROmarine

Not included ACCESSORIES

PRM180
deck mount 1"BSP x11 tpi male AISI316 stainless steel

PRM280
adaptor from 1"BSP x11 tpi male to 1"x14 UNS female - AISI316 stainless steel

PRM298
mast mount for mounting on pipe 1"BSP male **for vertical or horizontal mounting** - AISI316 stainless steel

V9174
stainless steel 1"x14 mount

RA107SSFME
stainless steel 1"x14 bracket mount

RA165
stainless steel 1"x14 rail swivel mount

An Australian Fishing Trip Made Better with weBBoat 4G

June 2015
vers. weBBoat 4G 1

Scott Harradine, TMQ Electronics
Technical Sales Representative &
High Seas Technician

PRODUCT TRIAL
MORETON BAY, QLD

To get a better idea of how the Webboat4G worked in comparison with standard mobile reception, a field test was required, and what better test than a boy's fishing trip..

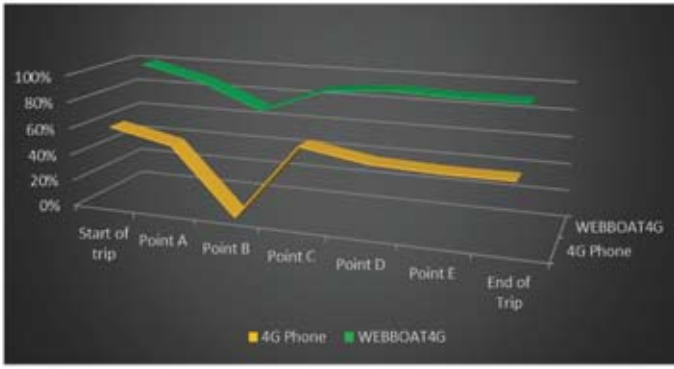
Introduction

The Webboat4G is a new product from Glomex Italy that enables the use of 4G mobile data WiFi/LTE while at extended distances from mobile towers. For the Australian marine market this is extremely unique, given the expanse of our coastline, mobile towers are spread fairly thin and even in well populated areas, 4G coverage areas are limited and patchy.

While having mobile data may not seem integral to the traditional operation or enjoyment of a boat in Australia, the ever increasing need for connection to social media as well as the all convenience that the rest of the internet has to offer, means that more and more people want to have data and internet access, no matter what they are doing or where they are.

Team this with the constant increase in new tech coming from marine electronics manufacturers that benefit from internet access, then it is easy to see the advantage in the new Webboat4G.

To get a better idea of how the Webboat4G worked in comparison with standard mobile reception, a field test was required, and what better test than a boy's fishing trip? Along with a Team member from our experienced local dealer *Trymax Marine Electronics* we headed out for a day of offshore fishing, to give us the best comparison we mounted the Webboat4G inside the aluminum cab on the dash, at the same height as what the other mobile devices on board were located.



Representation of signal strength comparing Webboat4G to 4G Phone

Our first indication of the Glomex antennas superior reception was actually in the marina itself, the Manly Marina is infamous for its poor phone and TV reception, all three of our phones dropped down to the bottom edge of 3G reception, however when we checked the status of the Webboat4G we had 100% 4G signal.

Heading across Moreton Bay towards South Passage Bar (a 40 min trip) during which the Webboat4G never dropped below 90% 4G signal, however numerous times all of our phones dropped to 3G and GSM and once as we looped through the Rous Channel we all dropped to emergency only.

By the time we got through the bar we were already impressed with the performance of the antenna, but while we stopped to get some live bait just outside the bar I decided to do some live speed tests which resulted in 5.8Mbps download and 3.98Mbps upload, and as a final test a nice morning Facebook picture upload was in order:

Strong Performer:
5.8Mps Download 3.98Mbps Upload

The Tech

All mobile phone towers have a built in sequence or "timeslot" for all their connected devices, as a device gets further away it begins to miss its timed spot in the sequence, if this happens to much it is then booted to a lower and slower frequency i.e. dropping for 4G to 3G because you moved to far away from a tower.

The Webboat4G, uses smart programing of its diversity modem to stay in the sequence for greater distances.

The antenna itself uses a high gain dual diversity antenna system that is directly connected to the modem/ gateway in the antenna, this in turn eliminates any cable loss that conventional 3G or "cell phone" antenna's systems have.

The maximum range of the antenna is still limited to the maximum range of the nearest tower, however the above features enable the higher and faster frequencies to be used up to 50% further then its traditional limits.

Other than the increase in 4G and 3G range, where the Webboat4G also shines is its simple use, a mobile data sim card is inserted into the bottom of the antenna itself, the user then logs onto the WiFi network of the antenna using their unique password, just like their home or office WiFi and that's it!

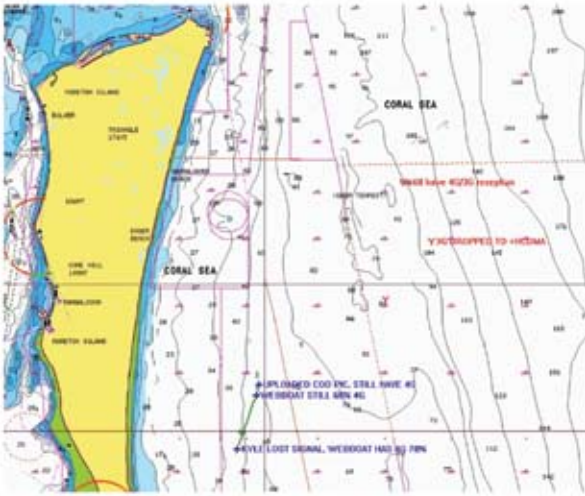
The user can also download a Glomex app to their mobile phone device to monitor the status of the antenna if they wish, or connect the antenna to an external WiFi hotspot such as that at a marina or yacht club.

SIM Card Slot

Inshore & Offshore Testing

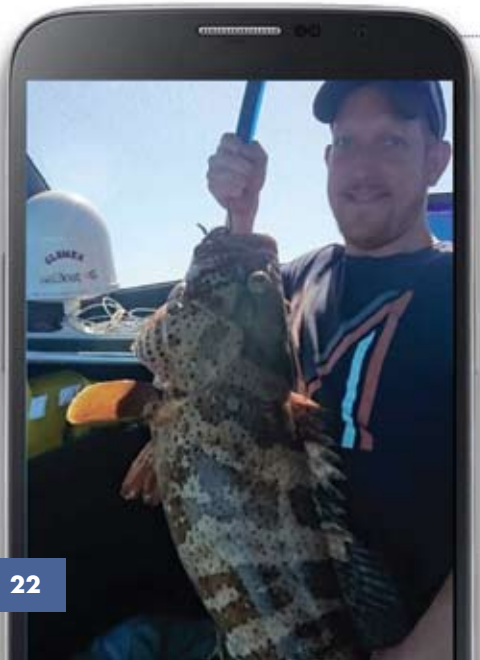
For the majority of the morning we stayed in 5nm range of the Eastern side of Moreton island, now while this doesn't seem like a large range, what makes this range impressive is that the only towers on Moreton Island are located at the Tangalooma resort and the Bulwer community on the western side.

At both sites the towers are only big enough to service the immediate area, so for us to have 4G 5nm east of the island itself was quite amazing.



(Right) Chart showing 4G Reception around Moreton Island

The morning also resulted in a few good catches. Which were of course uploaded immediately.



For the afternoon we headed further west, to an area known as Deep Tempest (can be seen on most charts), the area is in 100m of water and is +9 nm east of Moreton Island, and for the first time the Webboat4G dropped down to 3G and after another few nautical miles down to +HCDMA, however even then I was still able to upload to facebook within seconds.

Due to weather and time we decided to call it a day and head on home.

In Conclusion

In conclusion I can say that the Webboat4G exceeded my expectations and that of the other two on board. I can see the easy application of the antenna on any vessel that is used along coastal waters, from recreational sailing, fishing and cruising vessels to commercial vessels such as tugs, ferries and commercial fishing operations.

"We found the web boat to significantly outperform our mobile handsets for internet access in both inshore and offshore waters. It (the Webboat4G) offers an easy to use, cost effective solution to those looking for high speed internet at sea and those that don't want the added expense and slow speeds of satellite equipment."

Kyle Carlson
Senior technician/ Sales consultant
Trymax Marine Electronics QLD

Personal entertainment on your mobile devices

Thanks to the weBBoat you can watch Satellite TV programs on your smartphone, tablet or PC via wireless connection. With Sat IP, be free to watch TV whenever you want on your boat.

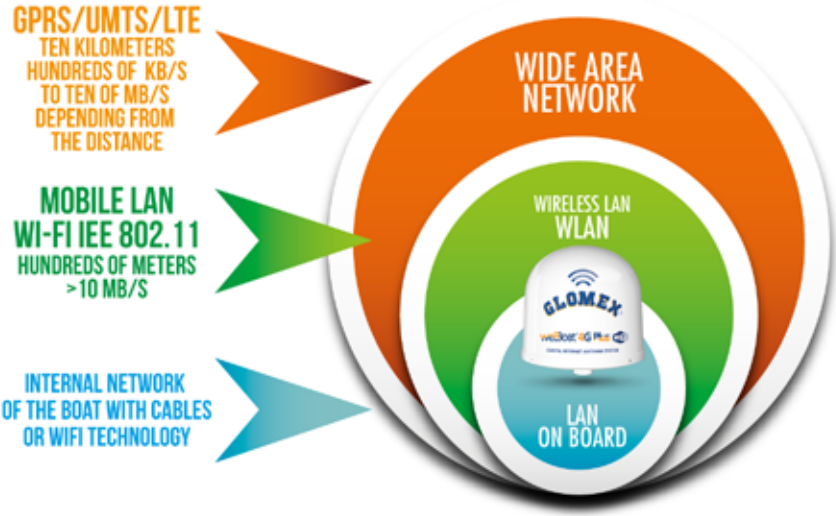
SAT > IP

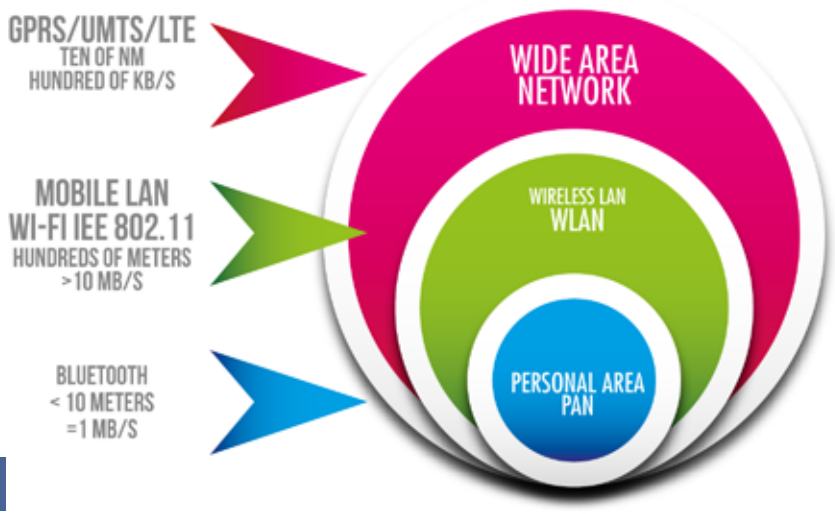
Multi-screen server
Satellite TV Reception

Data transmission

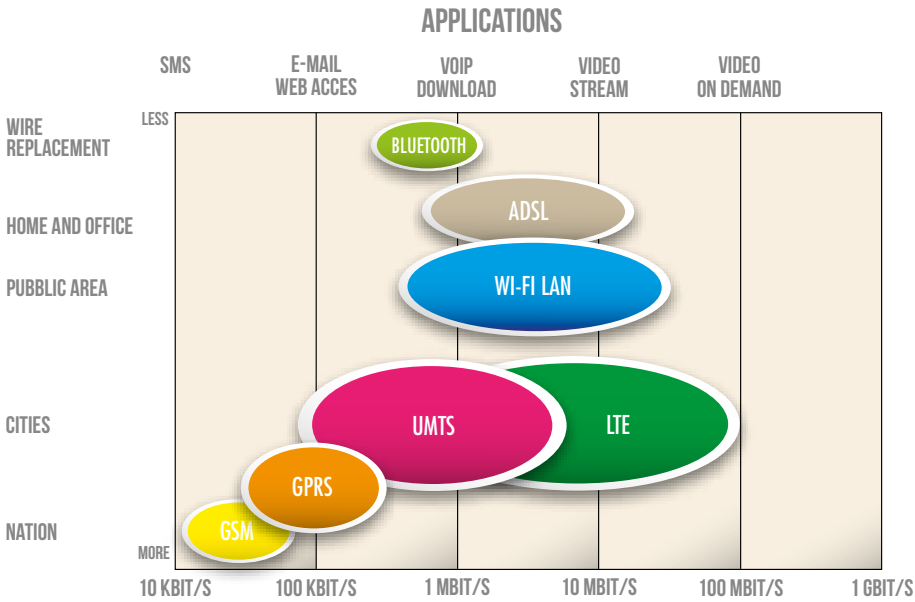
Every day we use various technologies for data exchange among these we see those that can be used in marine environments and their application.

Basically we can define a set of wireless technologies that allow communications over distances and increasing speeds, offer different performance and are generally used for specific purposes.





Specifically, applications determine which technology is the best for the use you intend to do as the performance is different. Often they coexist in the same network and overlap each other because their intrinsic qualities make them the best solution.

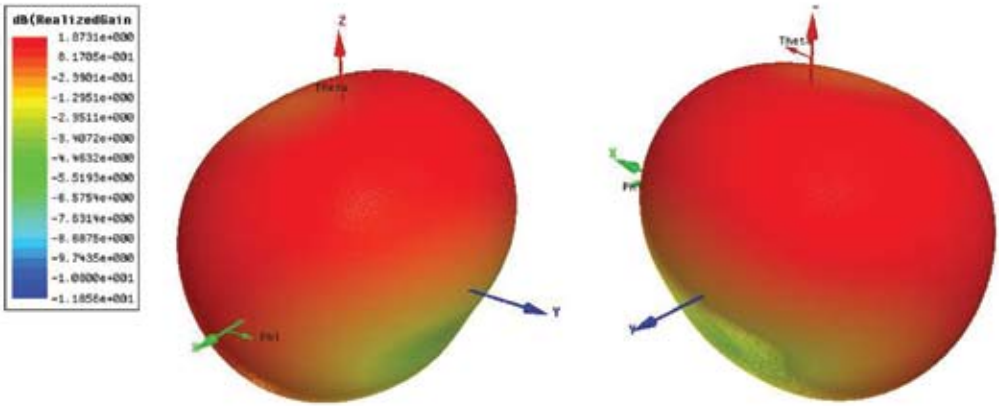


WeBBoat uses parts of these technologies to ensure an internet connection suited to sending **Email**, access to the **WEB**, **VOIP**, Downloads, **Video Stream**; in the future, with the realization of the full capacity of **the network LTE** (under development), **VOD** (Video on Demand) will be also possible.

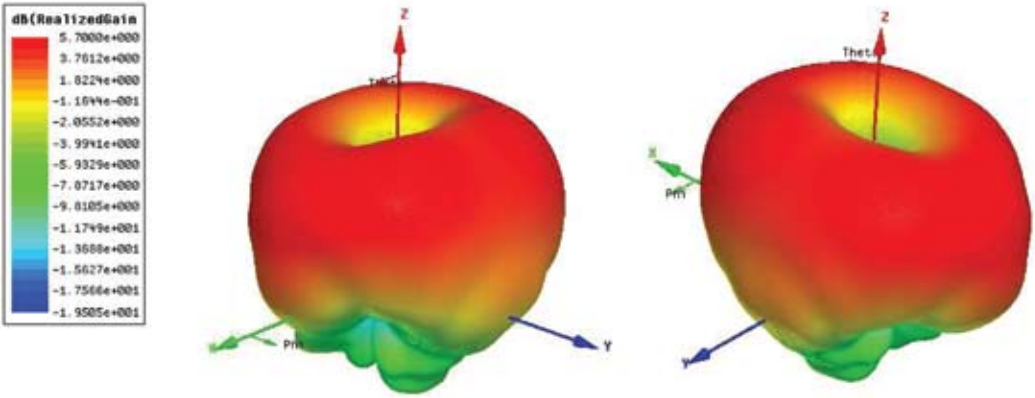
INTERNET

Internet is a worldwide network of computer networks for public access. Currently, it's the main mean of mass communication, which gives the user a wide range of potentially informative content and services.

It is a **global interconnection** between networks of different nature and extent, made possible by a common network protocol suite called "TCP / IP" from the name of the two main protocols, TCP and IP, which constitute the common "language" in which the computers, connected to the Internet (hosts), are interconnected and communicate each other at a higher level, regardless of the underlying hardware and software architecture and ensuring interoperability between systems and different physical subnets. The advent and diffusion of Internet and its services have represented a real technological revolution and sociological the early nineties (along with other inventions such as mobile phones and GPS) as well as one of the drivers of world economic development in 'field nformation and Communication Technology (ICT).



3D Gain (dB) Diagram at a frequency of 700 MHz



3D Gain (dB) Diagram at a frequency of 2.1 GHz

MOBILE NETWORKS

Let us now analyse the technologies used starting from cellular telecom networks.

2G

2G is short for second-generation wireless telephone technology. Three primary benefits of 2G networks over their predecessors were that phone conversations were digitally encrypted; 2G systems were significantly more efficient on the spectrum allowing for far greater mobile phone penetration levels; and 2G introduced data services for mobile, starting with SMS text messages. 2G technologies enabled the various mobile phone networks to provide the services such as text messages, picture messages and MMS (multimedia messages). All text messages sent over 2G are digitally encrypted, allowing for the transfer of data in such a way that only the intended receiver can receive and read it.

GPRS

The evolution of the 2G systems has led to the standard **GPRS** (General Packet Radio Service) that improves support for data transmission by introducing packet switching.

What you can do with GPRS?

The GPRS technology is now outdated and internet browsing via GRPS is rather slow, limiting it only to sites with outdated technology of the first generation. Via GPRS is difficult even using the Android and iPhone applications that require internet connection, such as instant messaging (WhatsApp).

EDGE

EDGE stands for Enhanced Data rates for GSM Evolution, and consists of a type of data transfer 3 times faster than GPRS, thanks to a more efficient modulation of the signal which allows to join several GPRS channels in parallel. It is also called generation 2.75G because it stands as the intermediate step between the GPRS (2.5G) and third generation (3G). Even the EDGE technology is outdated and internet browsing is slow, but it's still acceptable compared to GPRS.

What you can do with EDGE?

With EDGE connection we **can use more applications** that require internet access, and it also introduces new features: data transfer using FTP, video calls on GSM networks, and P2P (peer-to-peer) for sharing file.

Which speed EDGE reaches?

The EDGE network consists of an improved GPRS in terms of speed of data transfer. It can carry a bandwidth of up to 236.8 kbps with 4 time slots, about 4 times higher than the GPRS, and up to 473 kbps (assuming to use all 8 slots). In practice, the speeds are different from the theoretical ones just mentioned, and may vary in a range of 40-180 kbps.

Technologies	Theoretical speed (download)	Actual speed
GPRS	57,6 Kbps	25-40 Kbps
EDGE	236 - 473 Kbps	40-180 Kbps

1) Distance from the base station. The data transmission speed decreases with the distance from the base station radio, which also affects the type of decoding used. Unlike the GPRS, which uses 4 types of decoding (CS-1 to CS-4), the EDGE network it uses 9 (MCS-1 is the slowest, MCS-9 fastest).

2) The number of users connected to the cell; the greater the number of users that are using the connection and the slower is the speed connection. At certain time (as before dinner) the number of users will be statistically increased, making the EDGE service slower. The speed also depends on the number of time slots used within the TDMA "time frames" TDMA. The greater the number of time slots, the higher the possible speed.

3G

3G (stands for 3rd Generation), is an abbreviation used in the context of mobile phones to indicate the third generation technologies. The main difference between the networks of the second and those of the third generation is that the latter use the spectrum in a more efficient through the multiple access to the frequency band, allowing the exchange of data at higher speeds.

It is a technology that enables the transfer of data both "voice" (digital phone) and "non-voice", such as downloads from the Internet, sending and receiving email and instant messaging; between services of greatest interest to users, there is, for example, downloading of music files, the use of video services based on user-generated content, such as video blogs and moblog, etc.

3G standard

3G technologies are based on ITM-2000 specifications, issued by the ITU: originally thought to be an unique and unified worldwide standard, 3G was actually implemented in four different standards.

UMTS (W-CDMA)

The UMTS (Universal Mobile Telecommunications System), based on W-CDMA modulation in radio waves, is the standard prevailing in the countries where GSM is used (the majority are in Europe). UMTS offers a data transfer rate of 7.2 Mbit/s with HSDPA devices and 21 Mbi /s with HSDPA+ devices.

CDMA 2000

CDMA 2000 is an another important 3G standard; an evolution of the standard CDMA IS-95 developed within 2G. The operators that have installed networks based on this standard are mainly in America, Japan and Korea. The data transfer rate offered by this standard goes from 144 kb/s to over 3 Mb/s.

TD-SCDMA

It is a less well known standard, developed in China by Datang and Siemens AG that involved the operation for 2005.

Wideband CDMA

The data transfer rate offered by this standard goes from 384 kb/s up to 2 Mb/s: if used in a WAN

protocol it allows speeds of 384 kb/s and reaches 2 Mb/s in a LAN.

What you can do with 3G?

The introduction of 3G networks has opened the horizons to the real enjoyment of a range of multimedia services that we use with smartphones, tablets and internet sticks. The services are the same as offered by EDGE connection: video calls, MMS and web browsing but it is the quality that makes the difference.

Thanks to speeds much higher than GPRS/EDGE, 3G allows the viewing of videos on youtube without waiting times for loading, video calls free from annoying slowdowns, and to surf internet through the mobile phones on the sites in the desktop version, loaded with good speed even content-rich pages, scripts and images.

What speeds does the 3G reach?

Unfortunately, the rapid growth of mobile traffic (which doubles every year), reduces the average speeds and, according to statistics, when the service will be distributed the maximum speed **will be reduced to a range between 500 Kbps and 1.5 Mbps**.

4G

In the mobile telephony, 4G (acronym for 4th Generation) indicates the technologies and standards of fourth generation that enable advanced multimedia applications and data links with high transfer rate.

LTE

Born as a **new generation systems for mobile access to broadband** (Broadband Wireless Access) and, from the theoretical point of view, is part of the segment Pre-4G, placing in an intermediate position between the 3G technologies such as UMTS and those of the fourth pure generation (4G) still in the development phase. Nevertheless, with the intent to end the confusion between the marketing use of the 4G term and the true classification as 4G, ITU has recently decided to apply the term 4G to LTE too.

A goal of LTE is to **promote the use of mobile broadband**, exploiting the experience and investments for 3G networks and anticipating the times with respect to the availability of 4G standard.

It should be remembered that the standard 4G plans to achieve even higher speed wireless connection to 1 Gb/s

LTE can operate on different frequency bands.

Especially in the EU will be used the following bands:

- 800 MHz frequency band
- 900 MHz frequency band
- 1800 MHz frequency band
- 2600 MHz frequency band

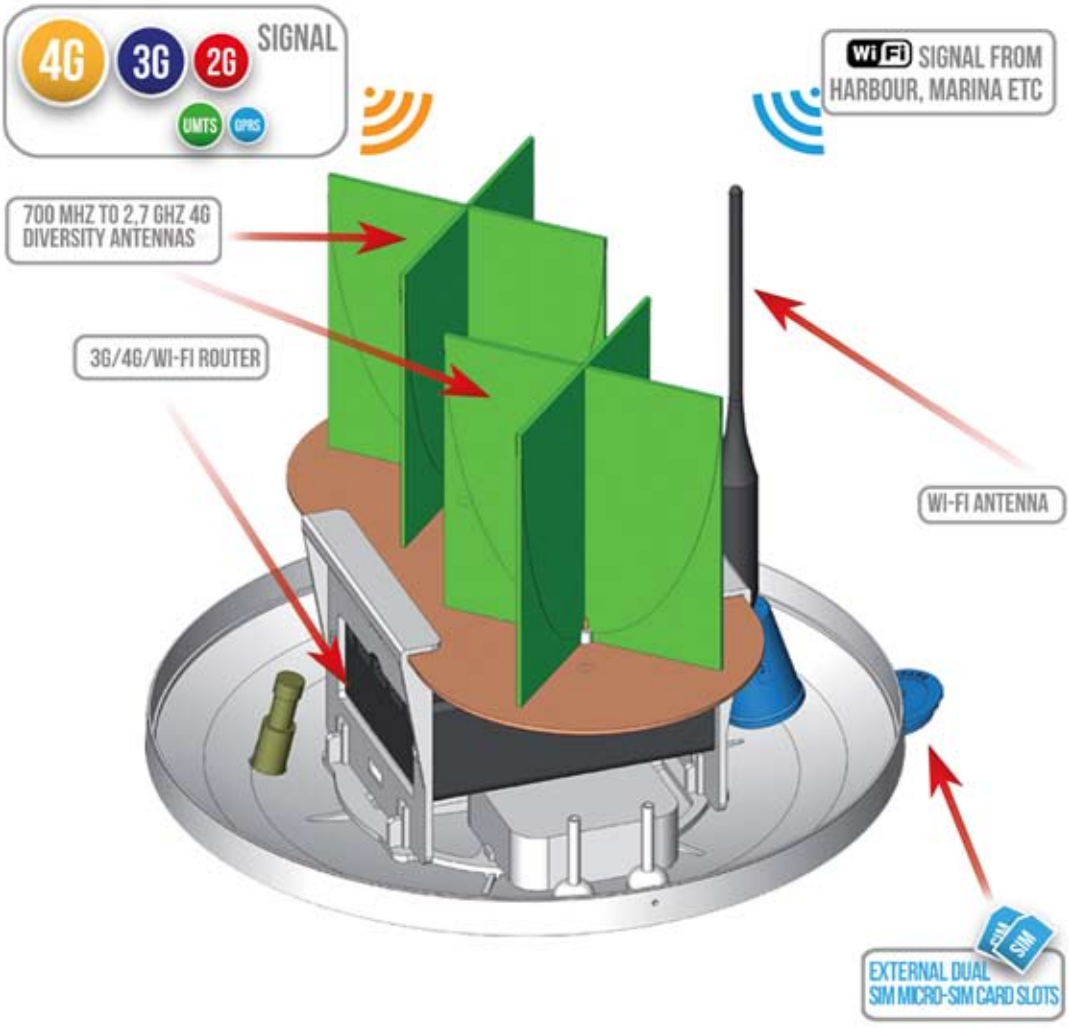
In the **USA** will be used the following bands:

- 700 MHz frequency band
- 900 MHz frequency band
- 1900 MHz frequency band
- 2600 MHz frequency band

Note for Europe: the 800 MHz frequency band is derived from former UHF TV channels 61-69 (occupying the band from 790 to 862 MHz), now free thanks to the transition to digital terrestrial of all European member states. This determines that the LTE system can disrupt the reception of television channels and you need to install a special filter in the line of TV antenna installations not already predisposed originally (Glomex LTE Filter – code: LTEF001)

WHY WE HAVE DEVELOPED DIVERSITY ANTENNAS

On the Marina, one of the main problems of telecommunication systems refers to multiple signals, due to the presence of obstacles that cause reflections (multipath fading). The Diversity antennas allow to benefit from this situation, going to combine together the various signals received. In weBBoat two very large bandwidth diversity antennas are used in receiving telephone signals for this purpose. Moreover, on the sea the main problems of telecommunication systems are the distance from the transmitter, the two high gain diversity antennas inside the weBBoat can receive also the weak signal to have internet connection up to, approximately, 20 miles from the coast.



WI-FI NETWORKS

In the telecommunications field, Wi-Fi indicates a technology and related devices that enable end-users to connect with each other through a local network wirelessly (WLAN) based on IEEE Standard 802.11.

The local network can be connected to the Internet through a router and use all the connectivity services offered by an ISP (Internet Service Provider).

Any device or user terminal (computer, mobile phone, PDA, tablet etc.) can connect to networks of this type when integrated with the technical specifications of the protocol Wi-Fi.

The Wi-Fi network is a telecommunications network conceptually comparable to a cellular network covering a small-scale (local), with two-way radio devices such as access points (AP) in place of traditional base stations of mobile radio networks (model client-server architecture). The Wi-Fi networks are relatively cheap infrastructure and allow to realize flexible systems for the data transmission using radio frequencies, extending or connecting existing networks or creating new ones.

To increase the area of connectivity of a single access point (approximately 100 m), whose transmission power is limited by specific regulations related to electromagnetic risk (100 mW), are commonly used multiple access points (and related cells coverage) connected by wiring in the local network. For example to cover a boat metal you must use this system architecture as the metal parts block the radio waves by reducing or inhibiting the coverage of AP. The part of the radio interface or radio Access Point-user is the access network, while the wired LAN that connects all the Access Point is the transport network. The coverage cells of AP are often partially overlapped to avoid coverage holes of the signal by creating an area

of full coverage, while the wired part is generally an Ethernet network. Each AP are “bridges” and have the task of sending the SSID that identifies the network or networks that are serving to stations radios in their wireless coverage via broadcast, while the set of stations served by the AP is called BSS (Basic Service Set). This network can be connected to the Internet network through a router taking advantage of the relative services internetworking.

System solutions without wiring are possible: connect directly into a wireless access points allowing their communication with exchange of information via radio even with a loss in spectral efficiency of the system. This kind of system solutions (without wiring) obviously entail costs and construction times significantly lower at the cost of lower connection performance.

The difference between Wi-Fi and the other cellular coverage networks resides in the communication protocols and in the operating frequency (2.4 or 5 GHz); to avoid collisions in the reception protocol is used multiple access CSMA/CA. The Wi-Fi protocols also allow to adapt the transmission speed in the wireless access is according to the distance of the mobile station transmitting by the access point, minimizing transmission losses.

To communicate with receiving stations placed in the coverage of other access points, each

station must be able to regiser/unregister, at the time of connection, to the access point of the cell (and possibly reassociate to another AP if the mobile station changes, over time, the coverage cell - handover) which, then, informs to the other Access Points its presence and its IP address. In particular, the recording of the station on the access point is made through the sending a normal data packet in which is contained the source address and the destination address.

The installation of antennas (i.e. access point) is simple. They are small antennas inside a box of few centimetres that already contain the necessary electronics and antennas for the operation.

Moreover, a Wi-Fi network can have a direct Internet access. In this case, the Internet system is similar to traditional ISPs providing an access point (the PoP) to users who connect remotely via wireless connection through the so-called hotspots. The source of broadband connectivity where the hot-spot is supported can be wired (ADSL or HDSL), via phone GSM/4G router, via satellite or through a Wi-Fi network. Today there are two-way satellite internet connections that allow high speed data transfer both in download and in upload. The satellite transmission, however, has high latency; the waiting time before it starts sending packets is about 1-2 seconds, a much larger compared to the few milliseconds necessary to a 4G

connection. Since the source of broadband it's possible to expand the network through Wi-Fi technology.

Wi-Fi Antennas

The typologies of these antennas are basically two: omnidirectional and directives.

Omnidirectional antennas are usually used to distribute connectivity inside offices, or at least in private spaces and relatively small (this was historically the main purpose for which it was designed the protocol Wi-Fi). Or, with larger operating ranges, you can cover public areas (such as airports, shopping centres etc.).

WeBBoat uses omnidirectional antennas Wi-Fi that are best suited to a boat.

Then, Wi-Fi has evolved to cover larger areas: with the use of directional antennas it is possible to cover large distances, Wi-Fi directional antennas are generally parables, placed on pylons because in the absence of obstacles the access point's signal covers greater distances. Directional antennas, that amplify the signal of the access point are usable by more users when placed at the top. Typically this type of antenna is used outdoors in infrastructure such as networks in marine.

With an access point with omnidirectional antenna, it can be covered, with broadband, up to a distance of 100 meters (household) if there is no obstacle as the crow flies. In the presence of walls, trees or other obstacles the signal decays to about 30 meters..

Certifications

A device, although complying with the standard specifications, cannot use the official Wi-Fi logo if you did not pass the certification procedures established by the Wi-Fi Alliance Consortium (Wireless Ethernet Compatibility Alliance), which tests and certifies the compatibility of wireless components with standards 802.11x (802.11 family).

Classes

There are various classes of Wi-Fi with different performance (as specified in the IEEE 802.11 standard), the most important are:

- class b: 11 Mb/s
- class g: 54 Mb/s
- class n: 450 Mb/s
- classe ac: 3 Gb/s

Positive and negative aspects of Wi-Fi networks

Comfort

Many networks provide data encryption and roaming, being able to move from the coverage of an access point to another without a drop of Internet, outside the range that defines a hot-spot.

Unlike the phone, the existence of a certified standard ensures interoperability between equipment and network abroad, without the cost of cabling (being wireless technology) for faster and easier installation and subsequent expansion of the network. From this point of view the Wi-Fi, often offered free of charge, is a standard competitor to Internet access via GSM and UMTS cellular networks which have an additional cost. The presence of several producers has created considerable competition by lowering the prices of this technology.

Technical disadvantages

The latency time of the Wi-Fi cards – i.e. the time interval that elapses between the moment when an input arrives to the system and the time at which its output is available - is slightly superior to those based on a cable with a maximum latency in the order of 1-3 ms (so it's negligible, unlike the GPRS/UMTS that have latencies in the order 150 ms).

A disadvantage of the Wi-Fi 802.11a/g may be the stability of the service (i.e. the quality of service - QoS) offered to the user, who due to noise on the signal can sometimes be discontinuous (for example the signal may be interfered by microwave ovens that when they are in function disturb the operating frequency of 2.4 GHz, the problem is solved with the use of the operating frequency 5 GHz).

Privacy

Most Wi-Fi networks do not provide any form of protection from unauthorized use (authentication), by sniffing the data communication (confidentiality) and on data integrity. This is due to the fact that when purchasing it, the default settings do not require the user to use a security method. Methods to avoid misuse were born together with the development of new technologies and the first system developed was the WEP, Wired Equivalent Protocol, but it is affected by security problems that make it unnecessary. You can suppress broadcast the SSID identification or restrict access to well-defined MAC addresses, but it is easily subject to bypass methods. To overcome these WEP problems, WPA end WPA2 were developed; they offer higher levels of security.

THE ETHERNET NETWORK AND ITS ACRONYMS

LAN

In informatics and telecommunications a Local Area Network (LAN) is a computer network connection among multiple computers, upgradeable to shared peripheral devices, which covers a limited area, such as a boat.

In the past, the LAN were based on technology standards as ARCnet and Token ring, but later the technologies have become more commonly Ethernet and Wi-Fi.

Where cabling is not possible or present, the Wi-Fi systems are becoming very common, especially for small networks and the widespread support of the networking of laptops, tablets and smartphones.

WAN

The communication geographical network, abbreviated WAN (from the acronym "Wide Area Network"), is a computer network that is characterized by having a territorial extension equivalent to one or more geographic regions. For example, weBBoat uses the network 4G as WAN.

Ethernet

Ethernet is a family of standardized technologies for local area networks, experimentally developed by Xerox PARC, which defines the technical specifications of the ISO-OSI networkmodel on the physical level (connectors, cables, type of transmission, etc.) and on the MAC level.

RJ45

RJ45 (Registered Jack English type 45) indicates a physical interface used for electrical wires in pairs of crossed wires (twisted pair). The specification is part of a series of modular connectors for telephone services and data transmission, standardized in the U.S.A. since the early 70s. It is a 8P8C connector, or 8 positions and 8 contacts (pins), which can be used for various applications including computer networks.

ITNCP001 connector RJ45

MAC ADDRESS

In informatics and telecommunications, MAC address (MAC stands for Media Access Control), also called physical address, Ethernet or LAN address, is a code of 48 bits (6 bytes) uniquely assigned by the manufacturer every ethernet card or wireless produced in the world, however, be amended in software.

It's essentially an identifier to a particular network device in the local network level: for example, two network cards in two different computers will have two different names (and therefore different MAC addresses), as well as different names have an Ethernet card and a card wireless positioned in the same computer.

TCP/IP

IP

In informatics and telecommunications, Internet Protocol (IP) is a network protocol that belongs to the Internet protocol suite TCP/IP on which is based the operation of the Internet.

It is a protocol for interconnecting networks (Inter-Networking Protocol) designed for interconnecting heterogeneous networks for technology, performance, management, therefore implemented over other link layer protocols, such as Ethernet.

It is a connectionless packet protocol and it's a best effort type as it makes the most of what you can do without ensuring any form of communication reliability in terms of error control, flow control and congestion control which then will have to compensate transport protocols of higher level such as TCP.

The currently used version of IP protocol is also called IPv4 to distinguish it from the newer IPv6, born from the need to better manage the growing number of computers (hosts) connected to the Internet.

An IP address is a numeric label that uniquely identifies a device (host) connected to a computer network that uses the Internet Protocol as the communication protocol. An IP address essentially performs two main functions: to identify a device on the network and thereby furnish the path for its accessibility from another terminal or network device in a communication packet data.

More precisely, the IP address is assigned to an interface (for example a network card) that identifies the host network, which can be a personal computer, a PDA, a router, etc. It must be considered, in fact, that a host may contain more than one interface: for example, a router has multiple interfaces (minimum two) for each of which must be an IP address.

Note: In the same network cannot exist two identical IP addresses as it would generate a conflict on addressing data.

TCP

In informatics and telecommunications, the Transmission Control Protocol (TCP), also called Transfer Control Protocol, is a protocol for packet network, part of the Internet protocol suite, which deals with transmission control, so it makes reliable the data communication on the network between sender and recipient.

Subnet Mask

The subnet mask, in the context of telecommunications networks, indicates the method used to define the range of belonging to an host in an IP subnet, with the goal of reducing the network traffic and facilitate the research and the achievement of a given host with its IP address.

Gateway

A gateway is a network device that operates at the network level or network services. Its main purpose is to convey the network packets outside a local area network (LAN).

Gateway is a generic term for the service of forwarding packets to the outside; the hardware device that will complete this task is typically a router. In simpler networks there is only one gateway that forwards all traffic to the outside Internet. In more complex networks, where many subnets are available, each of them refers to a gateway that will route data traffic to other subnets or redirect it to other gateways.

Often the gateway not only provide the basic functionality of routing, but integrate other services to and from the local network as a proxy, DNS, firewall, NAT etc.

DNS

The DNS is a directory service used for name resolution servers from textual and logical addresses (URLs) into IP addresses. This function is essential for the usability of the Internet, since humans can more easily remember textual names, while the routing devices (network interfaces and router level 2 and above) work on binary addresses. It also allows any entity to change or re-assign your own IP address, without having to notify the change to anyone except your root server.

Another feature of DNS is to allow, for example to a web site, to be hosted on multiple servers (each with its own IP address), with a resulting division of workload.

DHCP

In informatics and telecommunications, the Dynamic Host Configuration Protocol (DHCP) is a network protocol application that allows devices or terminals of a certain local network to receive dynamically to any request for access to an IP network the configuration needed to connect and operate on the network.

In a network based on the IP protocol, each computer needs an IP address, chosen in such a way that it belongs to the set of possible addresses assigned to the entire subnet (i.e. Net_ID) to which it is connected and that it is unique, i.e. there are no other device that is already using the same address.

The task of manually assign IP addresses to computers involves a significant cost for network administrators, especially in large networks or in the case of many computers that connect to rotation only to certain hours or days. Moreover IPv4 addresses (currently used in almost all of the networks in the world) with the increase of Internet-connected computers began to run low, decreasing the availability of fixed IP for any static configurations.

For the management of IP addresses through DHCP on the network must be a server dedicated to this service of assigning addresses to clients, in our case, this service is performed by **weBBoat**.

DHCP supports this task automatically and dynamically, ie only when requested by the host. It is used especially in local networks, in particular Ethernet.

Upon receipt of the network configuration from the DHCP server station or computer on the local network becomes in effect a host (host) of the Internet, and can take surfing sessions all the services offered by the network itself.

ISP

In informatics and telecommunications, an Internet Service Provider (ISP) is a commercial structure or organization that offers users (residential or business), upon the conclusion of a supply contract services related to the Internet, the main of which are access to the World Wide Web and e-mail.

Today most of the telecommunications operators are also ISPs and they provide, in addition to Internet access, services such as registration and maintenance of domain and hosting web pages.

APN – Access Point Name

An Access Point Name (APN) is the name of a gateway between a GPRS, 3G or 4G mobile network and another computer network, frequently the public Internet, allowing the data transfer a mobile device making a data connection must be configured with an APN to present to the carrier. The carrier will then examine this identifier to determine what type of network connection should be created, for example: which IP addresses should be assigned to the wireless device, which security methods should be used, and how or if, it should be connected to some private customer network.

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