

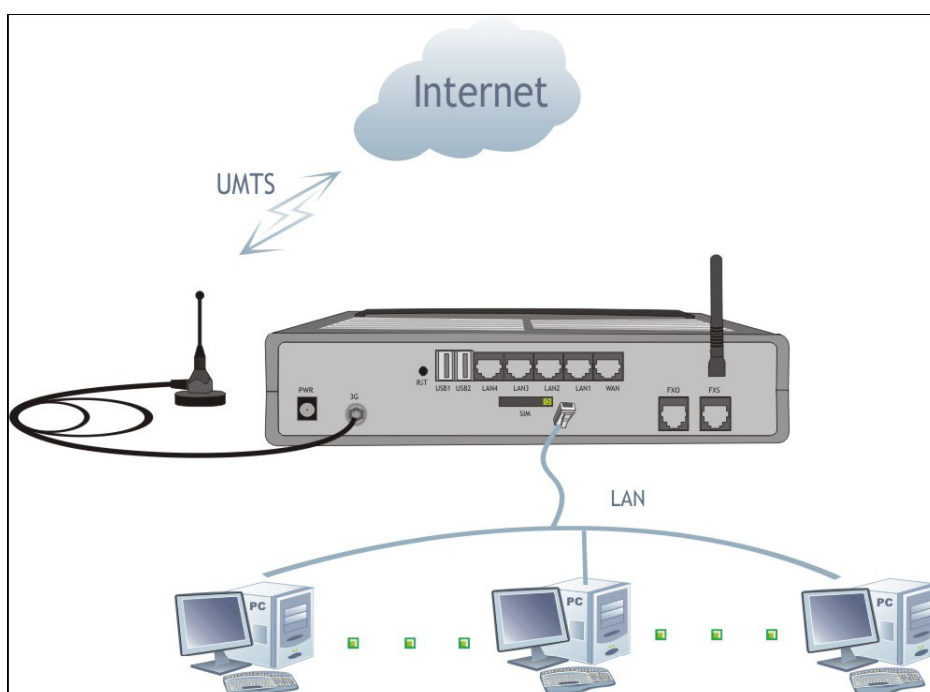


Voice and Data Connectivity Over High Speed Wireless Networks Applications Summary

This paper illustrates how to implement a number of wireless network configurations using Topex BYTTON UMTS, a versatile advanced router for wireless broadband Internet access using 3G technology.

The BYTTON UMTS.

The BYTTON UMTS equipment provides a simultaneous voice and data interface between a single phone or PBX exchange and GSM/GPRS/UMTS mobile networks. For wireless WAN connection it uses an embedded radio modem for the UMTS mobile network. Its 3G capabilities assure high speed Internet access up to 384 Kbps. This is really broadband mobile Internet at data rates many times greater than a dial-up connection. In areas where there is no 3G coverage BYTTON will connect via GSM or GPRS networks.



As a **data router**, BYTTON achieves a direct connection, transparent for the user, between the local network (Ethernet and/or WiFi) and the GSM/GPRS/UMTS mobile communications network.

As a **voice interface**, it allows wireless connection of the local subscribers and decreases the cost of fixed to mobile and mobile to fixed calls. BYTTON achieves a direct contact between a trunk or a local subscriber extension of a PBX over the mobile network. This way the fixed to mobile calls are converted into mobile to mobile calls which will be charged at only the mobile to mobile cost.

BYTTON UMTS removes the dependency on a fixed connection, so you may connect your LAN network to the Internet even in remote areas where there are no fixed connections (phone line, cable, optical fibre, etc). Also the WAN connection can be used to interface with other Internet providers than the UMTS network such as DSL cable modems or other wireless broadband modems.

BYTTON is fully wireless, since it uses radio connections not only for LAN and WAN, but also for configuration via a Web page. All computers on the wired or wireless local network can access the



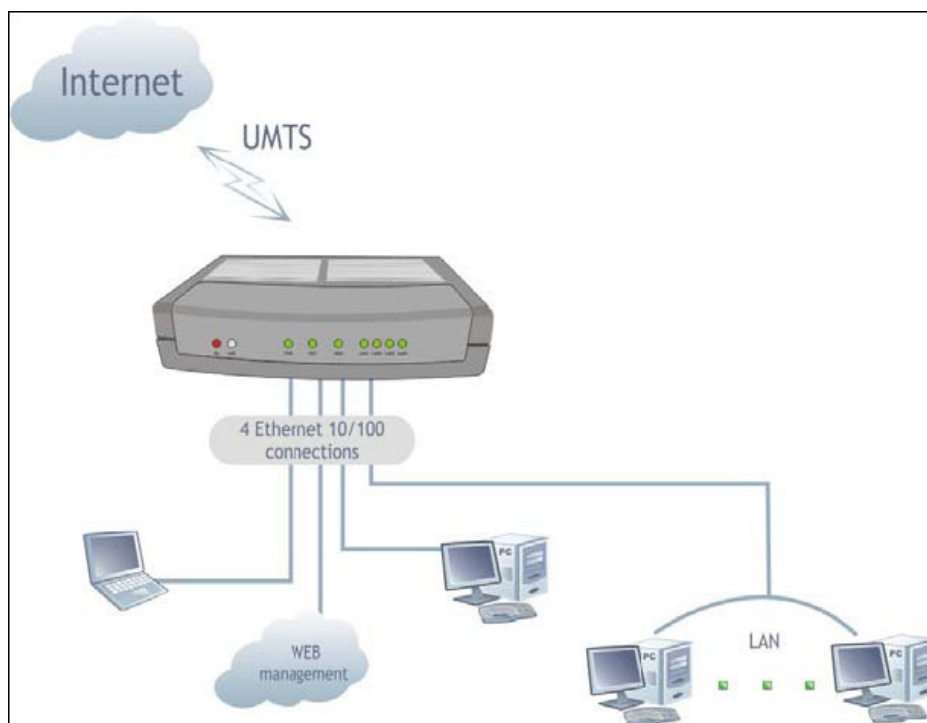
Internet through the UMTS Router, using only a single external IP address. The structure of messages is transmitted using standard communications protocols (TCP/IP, PPP, etc). These messages are fully controlled and traceable. The operating parameters of BYTTON can be easily changed by remote secure (https) access using a web browser.

The Topex BYTTON UMTS Router makes use of NAT (Network Address Translation) and SPI firewall to ensure protection for your local network, wired or wireless. The features of the firewall are identical to those available to Linux servers throughout the world, which are well renowned for their safety.

Applications

a) Wireless gateway/firewall/router using the UMTS network

BYTTON was designed primary for wireless use where it connects several computers, a local Network, or peripheral devices by means of its embedded UMTS modem. BYTTON acts as a powerful residential gateway, being a compact, all in one box (NAT, PAT, router, firewall), connected to Internet via mobile broadband UMTS technology.



Connected equipment may be both wireless clients via its embedded AP and wired (Ethernet) clients, that is computers and peripherals, at the same time. The access to data traffic does not require additional investment in equipment or software (router, switch , software, wiring operations). BYTTON UMTS allows connection to the local network (LAN) via four Fast Ethernet (10/100 Mbps) ports or via its AP.

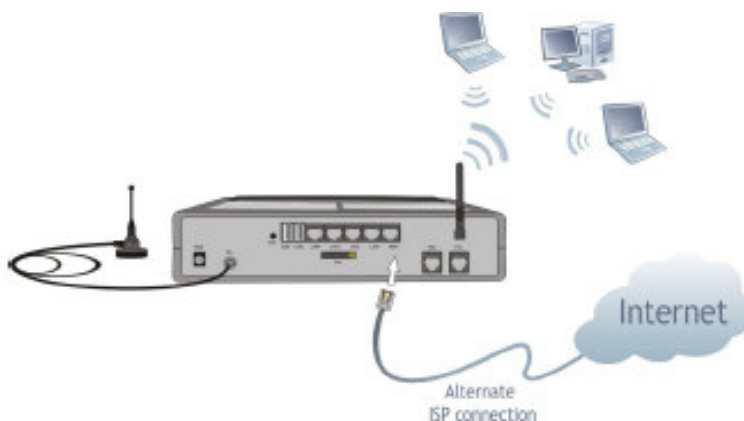
These kinds of applications are especially suited for business network environment, where land connections are not readily available. With BYTTON UMTS, you get simultaneous voice and high speed data wireless connection. In addition, temporary events (festivals, sporting competitions, trade fairs and exhibitions) may benefit from the use of a wireless broadband router. Even if the temporary event is located in the heart of the city, getting a wired broadband connection for only 2 or 3 days makes no economic sense.



Fields of applications may include Advertising & Marketing, Property / Estate Agencies, Logistics, Recruitment, Travel & Hospitality, Healthcare, Media & Broadcasting, Insurance & Finance.

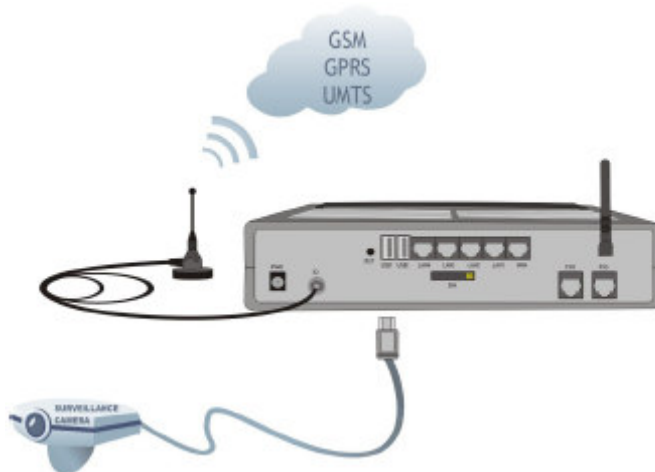
b) Broadband router with wireless local connections

The BYTTON may be used without its UMTS module by connecting instead a cable or DSL modem to the WAN port. This way, the equipment acts a broadband router with wireless or wired local connection.



Its embedded WiFi (802.11g) Access Points allows immediate radio connection to computers or peripheral devices (such as notebooks, PDA, printers, IP phones, surveillance cameras or other devices equipped with WiFi interfaces). Ethernet cables are not required to connect these devices and have all the advantages provided by the Wireless Access Points. Additionally the four LAN ports are available, and you may combine in different configurations the wired and wireless local connections.

c. Remote video surveillance with camera



With its built-in firmware BYTTON UMTS allows easy connection of one or several video surveillance cameras to a remote centre, transmitting the still pictures or video stream via its embedded UMTS modem. The device can accept high-speed imaging inputs from different types of cameras (with USB, Ethernet or WiFi interfaces). The USB webcams that are OV511 compatible may be connected directly to BYTTON, no additional firmware is required. The surveillance and the control of the camera may be performed remotely, from any web browser.



The firmware of the BYTTON equipment allows direct operation with webcams that are compatible to the OV-511 Linux drivers. This means a wide range of consumer or general purpose webcams, digital cameras and other video capture devices. It includes:

- Web cameras manufactured by well-known producers, such as HyperVcam from Aiptek, Cypress FX2 from Aplux, popular models from Chicony, Creative Labs, D-Link, Genius, Mustek, OmniVision (a whole gamut), ToUCam 720, 740 and 820 from Philips, Plustek, Pretec, EyeToy from Sony.
- Digital cameras and three-in-one devices such as TV-PC from TRENDNet, SpaceCam from Trust, PenCam from Aiptek, Video Blaster from Creative, DualCam from Ezonics, cameras from Han Shing or SVP
- Some USB Video Capture Devices and TV Tuners.

Installation and operational considerations

BYTTON UMTS was designed for indoor use only, it should not be operated outdoors. It should be installed indoors where the environment provides :

Operating temperature range is from 5 to 50 degrees C

Relative humidity is from 10 to 85 %, non-condensing

In order to determine the best location for the BYTTON router, take into account:

- Ethernet cables that connects the routers the network must not exceed 100 meters.
- A high location, on the wall or on top of a desk or a shelf is best both for the UMTS connection and for the Access Point. Also, BYTTON should be kept clear of obstructions and away from heat sources, direct sunlight and heavy-duty electrical equipment.
- To ensure good coverage to all of the wireless mobile devices in your area BYTTON UMTS should be installed in a central place in the building. Normally the antennas should be in vertical position, but if reflections occur, you may get better results by changing their orientation.
- If your site has low level of UMTS signal, it may not be possible to use the full UMTS technology without a special, high gain antenna. Topex can supply such antennas to be installed in a higher position (the roof the building) and directed towards the base station of the UMTS network carrier.
- While the device is in operation, the antennas of the BYTTON UMTS unit should be at least 30 cms away from any human being.

BYTTON UMTS can properly perform its functions of a wireless high-speed router with the default settings. However, it can be easily configured to meet various usage scenarios. The embedded Linux firmware allows the configuration to be changed without additional software. Access to the configuration menus is through a web browser. This means that BYTTON UMTS may be used on any computer platform, is not restricted to a particular operating system and configuration may be performed remotely. The PC or notebook may be connected to the router either directly, through a hub and can be wired (Ethernet) or wireless (WiFi).

Wi-Fi operational range

Each office or home environment is unique because of different topologies, size and shape of rooms, materials, and so on. Please remember:



- The specified transfer rate is the speed at which individual bits of data flow through a channel, not necessarily the speed at which entire files are uploaded or downloaded the actual speed may vary, and often will be less than the maximum data rate
- Wired or wireless speeds are affected by several factors including the availability of Internet routers, the level of loading of the 3G cell, the capacity of and services offered by your mobile network service provider, channel capacity, network traffic, computer equipment, type of server, number of connections to server, etc.
- In the frequency bands used by WiFi, radio signals may be absorbed (damped) by some obstacles or reflect off of other obstacles, depending on their construction. The standard specifications for 802.11b devices guarantee “up to 350 m in open space”. This is achieved outdoors where the two devices see each other with no obstacles (they have a line of sight). The same two units may only achieve up to 100 m of range when used indoors. Heavy concrete or metal walls may further decrease this range.
- The IEEE 802.11b specification supports four data rates: 11 Mbps, 5.5 Mbps, 2 Mbps, and 1 Mbps. Operation at 1 Mbps provides greater range than operation at 11 Mbps and so on. The BYTTON UMTS Router will automatically adjust the data rate to maintain a usable radio connection. This means that a WiFi client that is close to the TOPEX UMTS Router may operate at 11 Mbps while a client that is on the far limit of coverage area will only operate at 1 Mbps. If you want a very high data rate, the effective wireless range of the BYTTON Router will be reduced.
- The same considerations hold true for the specification IEEE 802.11g: the maximum data rate (54 Mbps) can be reached only if the signal strength is good enough. This means the typical range in an office building may be just 20 m if you insist upon a 54 Mbps throughput, but it will increase to 50 m if a transfer rate of 11 Mbps is acceptable for you. Precisely because of their higher data rates, 802.11 g devices may be more susceptible to interferences.

Firewall Security

BYTTON features a firewall that uses static and dynamic packet filtering. The static packet filtering firewall examines each incoming and outgoing packet based on several criteria such as Source IP address, Destination IP address. BYTTON comes with a default configuration for the firewall, which ensures the security of your local network. The firewall and advanced packet routing can be configured using the *iptables* command. For more information, see <http://www.netfilter.org>.

The firmware automatically installs the basic rules that are required. Configuration allows for additional rules, the ones that you are allowed to modify, to supplement or delete. For instance, if you enable the Webcam feature, the firmware opens the port 2000 for TCP traffic or if you enable the NTP service it opens port 123 for UDP traffic, and so on.

Equipment note:

The BYTTON UMTS model has now been enhanced with a HSDPA option where the potential for 3.5G exists to provide higher access speeds to the Internet (up to 2Mb per sec). See separate application note.