The Tactical Base Station Router (BSR) from Lucent Technologies

An invaluable addition to military communications

Benefits:

- Compact solution
- Extreme flexibility
- Very short deployment time
- High capacity, high throughput
- Highly resilient against interference
- Inherently secure

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Introduction

The role of military organisations is currently changing. Together with the traditional task of defending home territory there is now a growing requirement for operations by multi-disciplinary forces. Operations are often deployed at very short notice into unfamiliar territories. Many military organisations have therefore implemented specially trained rapid reaction forces to enable them to meet the new challenges.

Operations now require a diversity of disciplines, complex command structures and extensive logistic support. Therefore to enable the successful execution of such operations, highly secure communication solutions offering large capacity, extreme flexibility and very high reliability are vital. It must be possible to disseminate voice, data, military messaging, video and electronic command systems such as C2 representations to and between multiple parties in the same way that fixed HQs can now expect. Examples of such communications are:

- Individual soldiers in the front line
- Forward air controllers observing enemy positions
- Patrols maintaining peace in a hostile city

Equally importantly it must be possible to deploy the communication solutions quickly and efficiently, often in very pressurised circumstances.

Lucent has recognised these communication challenges by leveraging the recent development of modern commercial mobile communications systems. Accordingly we propose the 3rd Generation UMTS Base Station Router (BSR) - a complete area communication system in an easily-transportable package.

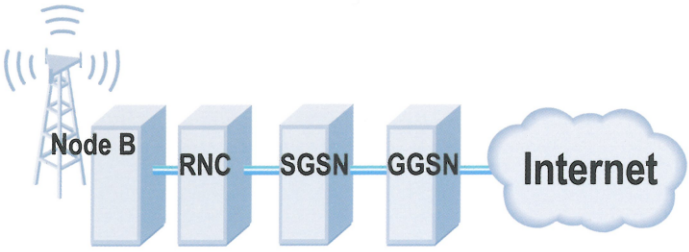
The BSR is a small, self contained, robust unit. Using 3G technology it provides reliable, secure and high bandwidth local area communications to its users. In addition, it offers very low roundtrip delays (latency) making it the solution of choice for real time and near real time communications such as video, real time access to information databases and voice over IP (VoIP).

Due to its use of standard IP protocols, a BSR system can extend the control reach of headquarters, base area and other C2 centres by a variety of high speed backhaul connections such as satellite, ISDN, leased lines and - Digital Subscriber Link (DSL) etc.

Depending on local environmental conditions, building density and antenna capability, the BSR is able to cover a realistic local radius between 5 and 10 Km, although it can reach well beyond this. It also offers full mobility, which means that its coverage reaches vehicles in transit, just as a traditional UMTS system does. Moreover, multiple BSRs can work together to create a seamless network with in-built resilience so that if, for example, a BSR is taken off the air, other BSRs will automatically assume the load.

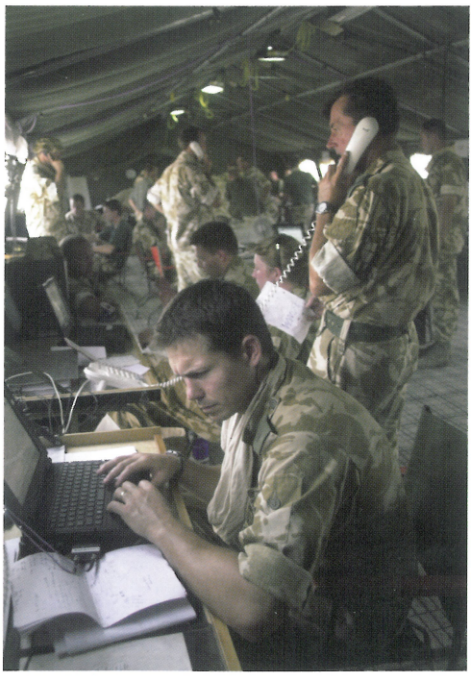
Rapid deployment

The BSR removes the need for complex network architectures to offer UMTS communications.

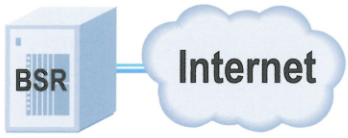


Traditional UMTS network architecture

Traditional UMTS network architectures are unsuitable for rapid field deployments since they require the installation of several physical nodes (including base stations, radio network controllers, and serving GPRS service nodes), but the BSR combines these into a single, rapidly-deployable package.



The BSR therefore vastly reduces the complexity of conventional UMTS networks. By combining the functionality of several individual UMTS components into one single package, bottlenecks that might occur between nodes as well as any round trip delays (latency) introduced by individual nodes, have also been removed.



The BSR simplifies the UMTS network architecture

The BSR dramatically reduces the physical size and weight of a UMTS network. A micro-BSR is the size of a medium sized suitcase and is portable by a single person.

All these benefits make the BSR ideal for contingency use since it offers:

- Rapid deployment, so that a single-unit network could be operational in minutes and a networked mesh of BSRs could cover a town area in the time taken to deploy and set up rear link communications.

- Compact design; the BSR can easily be mounted in all-terrain vehicles or deployed by airborne delivery.

- Pico BSR models, small enough to be carried in a back pack are being explored.

UMTS for military applications

Universal Mobile Telecommunications System (UMTS) uses a spread spectrum technology based upon Code Division Multiple Access (CDMA). This technology was originally developed for military purposes in order to make connections extremely secure.

UMTS using CDMA is noted for its spectral efficiency - in other words its high bandwidth throughput in a limited radio spectrum - enables it to handle a large number of simultaneous high data rate connections. And in contrast to other cellular technologies, UMTS is extremely resilient to interference and 'over the air' hijacks such as 'false base station' and 'jamming' attacks. Furthermore due to the way CDMA encodes traffic over-the-air, completely independent BSR networks are able to operate in the same frequency spectrum without affecting each other, giving further flexibility.

The BSR dramatically reduces the time and cost required to implement a mobile communications network to support military operations. In particular it provides a secure and reliable solution to the traditionally challenging "last mile" connectivity problem. This IP-based technology has been embedded in a single, lightweight and highly deployable cabinet and creates a complete mobile communications system in a box.

It offers a compelling and operationally effective communications solution to defence and emergency requirements, while also permitting a simple cost-effective means of accessing the latest ongoing commercial developments.

Versatility

UMTS technology is suitable for all types of communications including voice, data and video. It can support all existing applications of these media and due to its transparency, will support applications planned for future release.

To further enhance the throughput and round trip delay (latency), the BSR will support both High-Speed Downlink Packet Access (HSPDA) and High-Speed Uplink Packet Access (HSUPA).

HSDPA is already commercially deployed; operational networks indicate a consistent practical bandwidth of 3.5 Mbps for the uplink, which is set to rise even further in the near future.

HSUPA is currently released and will give a practical bandwidth of 3.5 Mbps for the downlink. Enhanced uplink perfomance is expected with future releases.

The BSR has been designed to evolve thus future enhancements and improvements will in many cases be achieved with software upgrades only.

UMTS: a Proven Technology

A major benefit of UMTS is that it is a proven, commercially available technology. Lucent has more than ten years experience of spread spectrum which underpins all UMTS networks.

As the technology is currently available, the BSR merely needs to be tailored to meet specific requirements such as security and ruggedised enclosure.

End-to-End Security

Although the UMTS/CDMA 'air interface' link offers wide a variety of services, full flexibility is achieved by connecting the BSR to the selection of available backbones including ISDN, DSL, SATCOM and line-of-sight microwave links. As some of these links may be commercial or vulnerable for other reasons, making them secure is vital and the most practical way is to implement end-to-end security.

This will be achieved by the use of government-approved high-grade encryption technologies, to be implemented in the user equipment and at the point where it can be assumed that all traffic processed is fully protected.

These include:

- Where needed, end-to-end, high grade, government-standard security.
- IP encryption at above Layer 3 to enable routing through virtual circuit routes as required.
- Where appropriate, "loseable" high-grade; the system of choice for scenarios of high risk
- Protection of data at rest within terminal devices.

To ensure that only legitimate users are able to use the BSR network, authentication of users will be provided by Lucent's award-winning 'VitalSuite™ ' AAA server system.

Summary

The fundamental parameters for military systems - high capacity, extreme flexibility, mobility, inherent security and simplicity of deployment, would make the BSR an invaluable addition to the military community.

Speed of deployment makes the BSR ideal for urban contingency use.

It is confidently expected that it will find a ready place within the spectrum of military systems by offering the following:

- Very short deployment time
- High capacity, high throughput
- Low roundtrip delays (latency)
- Highly resilient against interference, false base station attacks and jamming
- Standard IP interfaces to allow for flexible backhaul connectivity

Lucent Technologies designs and delivers the systems, services and software that drive next-generation communications networks. To learn more about our comprehensive portfolio, please visit our website at www.lucent.com.

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Lucent's technology partners for the 2006 Coalition Warrior Interoperability Demonstration

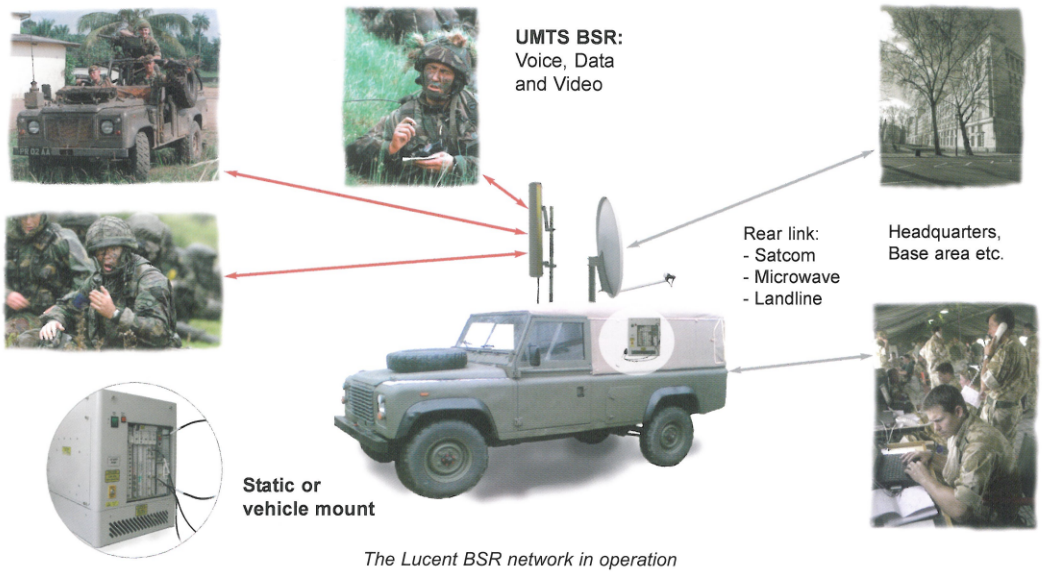
For the Coalition Warrior Interoperability Demonstration (CWID) in 2006, Lucent is assisted by three partner companies; Fortress Technologies™, Northrop Grumman, and Juniper® Networks.

Fortress Technologies, a leading provider of secure wireless networking solutions for government, military and regulated industry markets is providing a secure gateway device to protect the backhaul of our network between Portsdown and Lillehammer, whilst Grumman Northrop is providing a demonstration C2 system application to demonstrate the data handling capability of the BSR. Meantime Juniper Technologies has contributed a zone-secure ADSL modem to further protect our alternate ADSL access via Internet.

The NATO Command Consultation and Communication Agency will utilize the BSR as a communications system to carry the data generated by the NC3A Multifunction Access Gateway (MFAG) device, which will, with end-to-end high grade security inbuilt, carry data from a major NATO C2 system. We are delighted to be able to assist NATO in this way and again look forward to serving the Alliance in the near future at this time of network enabling initiatives.

Fortress Technology Integrated Access Switches are all-in-one network access devices with built-in security. The ES520 Security Gateway combines the functions of an access point, wireless bridge, switch, and security gateway in a small and rugged form factor. It is ideally suited to work as a self-contained network, whether for use in rapid deployment and incident response, a tactical network or fixed wireless application. By bringing immediate "on-demand" secure voice, video and data solutions to a disaster area or the battlefield, first responders, relief workers and soldiers can save more lives. The ES520 Security Gateway is engineered specifically for harsh outdoor environments and provides a flexible, easy-to use solution that meets the most stringent security requirements.

Lucent wishes to acknowledge with many thanks the contribution of our partner companies, and looks forward to integrating their products into our system in the longer term future.



The Lucent BSR network in operation

For more information about
Lucent's Base Station Router, please contact:

Andy Warnes
Lucent Technologies
Tel: +44 7841 317141
E-mail: warnes@lucent.com

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