Lucent Technologies
Bell Labs Innovations

Dual Band For Your Network

Making the most of integrated GSM Networks

Traditional GSM networks have been designed, optimised and operated based on a single spectrum allocation. With the widespread introduction of GSM 1800 and the issue of new licences, this single band approach is now evolving. Dual Band gives operators greater opportunity to increase capacity and coverage in their networks and maintain their position in the GSM marketplace. To help operators take advantage of new 1800MHz spectrum, Lucent is addressing the technical and commercial issues faced in this rapidly expanding environment.



The introduction and coexistence of both 900MHz and 1800MHz systems needs special consideration regarding integration and operation. In addition, the phenomenal increase in GSM subscribers sets a new challenge in network planning and equipment deployment to cope with demand. Lucent Technologies' Dual Band solutions expand network capacity and offer subscribers a far superior and reliable service.

WHAT IS DUAL BAND?

The term "Dual Band GSM 900/1800" is used to denote a network that supports mobiles for:

- GSM 900
- GSM 1800
- Dual Band GSM 900/1800

Lucent's Dual Band offer unites GSM 900 and GSM 1800 into a single network. This combination of multiple technologies gives operators the opportunity to expand their networks wherever GSM coverage is available, whilst at the same time providing the subscriber with a seamless, quality service.

WHY CONSIDER DUAL BAND?

Increase Capacity

Dual Band's key advantage is that it offers a simple and cost-effective solution to add capacity to a network by the addition of GSM 1800 spectrum.

The combination of both 900MHz and 1800MHz frequencies greatly increases overall spectrum which together with tight frequency reuse improves the availability of traffic channels.

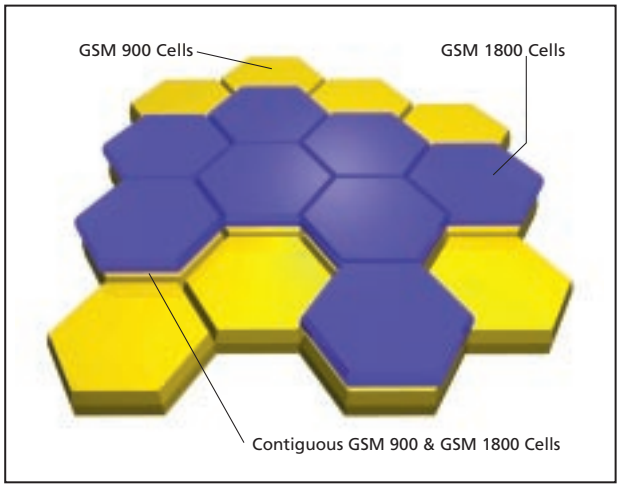
Quality Improvement

Another major benefit of Dual Band is improved quality of service. The greater number of traffic channels available reduces blocking and decreases the number of dropped calls. This is especially important as traffic volumes and the number of mobile subscribers have been much greater than predicted.

Cost Effective Deployment

Dual Band is easy to deploy and roll out. GSM 1800 Base Transceiver Stations (BTSs) can be co-located with GSM 900 system sites to provide hot spot traffic relief. This is especially relevant in dense urban areas where existing GSM 900 cell grids are already minimised due to heavy traffic and interference. By co-locating the new GSM 1800 sites with the existing GSM 900 sites, contiguous coverage is achieved over the designated area. Alternatively, a GSM 1800 system can be separately deployed above or below a GSM 900 system which supports GSM 1800 only mobiles. Lucent's multi-layer algorithms can be used to optimise existing coverage whilst positioning the network for future growth.

Dual Band deployment may be designed to satisfy other network requirements, for example,



Contiguous Coverage in Urban Areas

GSM 900 may be considered sufficient for rural areas with Dual Band/GSM 1800 in urban areas where capacity is more of an issue. Operators may also assign a specialisation to each band, for example for indoor coverage or partitioned for all data services.

WHAT LUCENT'S DUAL BAND CAN DO FOR YOU!

System operators may consider using GSM 1800 spectrum to expand their network. In this case existing GSM 900 operators can relieve congestion and support new subscribers through additional capacity provided by GSM 1800.

Lucent has been addressing some of the issues raised by the introduction of Dual Band and these are being resolved with the following current and proposed features:

• *Multi-Band Base Transceiver Station*

The ability to configure Lucent Base Transceiver Stations (BTSs) with six cells will enhance the Dual Band offer. This enables a 2+2+2 Transceiver (TRX) configuration for both GSM 900 and GSM 1800 within a single cabinet. This allows the operator to deploy GSM 1800 cost effectively within Lucent's existing BTS-2000/12 Indoor cabinet, without needing a separate cabinet for GSM 1800 coverage.

• *Band Preference*

To help with capacity problems in a Dual Band network, Lucent have provided the capability to drive Dual Band mobiles to the GSM 1800 layer when traffic volumes reach a given threshold in the GSM 900 layer.

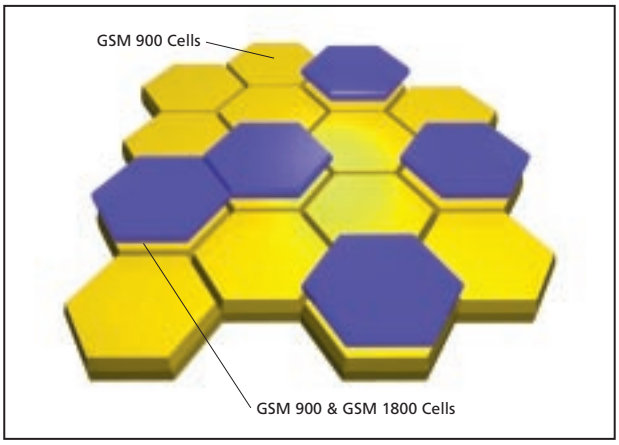
• *Dedicated Mode Broadcast Control Channel Allocation (BA) Lists*

The Mobile Station (MS) measures the neighbouring cell frequencies and creates a list of the most suitable candidates for handover based on the strongest signal. There are separate BA lists for single band mobiles and Dual Band mobiles.

• *Adaptive BA Lists*

Depending on the position of the MS in relation to

the cell, it is possible to adapt the BA list on a per cell basis. This speeds up the search and improves accuracy of the frequency measurements. By choosing the most robust cell as a handover candidate, it is possible to direct mobiles to specific bands by directing the MS to a particular BA list.



Hot Spot Solution

• *Load Management*

Operators frequently experience cases where certain cells in their network are prone to particularly heavy traffic loads, whilst neighbouring cells have relatively low traffic levels. Lucent has developed a system to assign weighting factors to a cell depending on its load which has the effect of moving the cell borders. If the cell is heavily loaded the cell area is effectively reduced and increased when there is light traffic. This balances traffic by causing automatic handover based on the weighting factors being applied to the cell. The factors are positive or negative according to whether they are trying to reduce traffic load or alleviate congestion in neighbouring cells.

In-Building and Campus Solutions

Another advantage of Dual Band is where localised GSM coverage is required. This covers private campus and manufacturing sites as well as in-building solutions for offices. A wireless GSM Private Branch Exchange (PBX) can be installed for internal use offering features associated with wired PBX systems such as abbreviated dialling and preferential billing. Some establishments may be encouraged to adopt Dual Band telephony as this will be the technology of choice for wireless PBXs.

User Perspective

Operators Offering Dual Band Gain More Subscribers And Generate Greater Revenue.

There are a variety of Dual Band mobiles available today and new ones are constantly being introduced. The increase in demand for Dual Band mobiles will result in price competitiveness and the opportunity for operators to creatively bundle services that can be offered at attractive tariffs. These new packages can be targeted at those most interested in using the latest technology, such as heavy business users.

Roaming

For the network operator offering Dual Band there is a wider choice of other overseas operators when deciding on partners for roaming agreements. This in turn gives subscribers greater confidence in using their mobile when travelling abroad. A high percentage of revenue can be achieved through accommodating roamers, especially heavy usage customers such as business travellers.

Lucent's Dual Band – The Right Choice

Growing capacity requirements, advanced service requirements and market and regulatory pressure have expedited the evolution of Dual Band GSM 900/1800. It is envisaged that Dual Band network deployment will consist of a combination of the approaches described according to operator, network and service requirements. Open standards and architecture-based products foster integration and interoperation with other supplier's equipment. As more operators enter alliances and agreements, global networks are proliferating especially in the wireless industry today.

With Lucent's extensive experience in developing and deploying wireless systems, we understand the importance of flexibility in network design which will help the operator achieve success in GSM business. By offering technologically advanced equipment and comprehensive support services, *Lucent is the partner of choice in this dynamic world of international personal communications.*

Lucent Technologies has been a leader in telecommunications for more than a hundred years. From microchips, to entire GSM systems, our hardware and software solutions together with full support services are used all around the world. Bell Labs, Lucent's innovation engine, is at the forefront of telecommunications research and development, constantly refining current technologies and investigating new possibilities. Lucent also offers comprehensive and astute business consultation on issues such as marketing, sales and customer care. To learn more about how we might be able to help your business, or if you have any questions, we urge you to contact us.

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