

Arlanda Express

COVERAGE SYSTEMS



Powerwave provides multi-operator GSM 900 system for Arlanda Express fast rail

Reduce Initial Investment & Lifetime Costs

Complex Environments

Multiple Operator Solutions

Challenge

Provide seamless, wireless coverage for commuting passengers in complex, underground environments, minimizing costs for network operators.

Solution

A cost efficient, fiber optic repeater system from Powerwave which gives each operator access and remote monitoring capabilities.

Result

A turn-key, future ready solution in a complex environment with high quality and reliable fiber optic repeater systems.

Transit between Stockholm's Arlanda International Airport and downtown Stockholm is vastly improved for millions of passengers with the Arlanda Express rail link, making airport commuting easier, faster, more comfortable and more convenient. Seamless GSM coverage for passengers traveling to and from the airport by Arlanda Express is of great importance to three Swedish mobile operators. Joining forces to cover 5 kilometers of tunnels north and south of the airport, they contracted with Powerwave to deploy a comprehensive fiber optic repeater network.

Seamless Coverage Passengers at major airports today expect nothing less than seamless cellular phone coverage, thus creating challenging opportunities for operators to capture profitable roaming traffic. A network operator wants to maximize revenue and minimize costs. The best way for operators to achieve this at Arlanda was to collaborate in deploying a joint, cost efficient system. Their solution of choice was a fiber optic repeater network from Powerwave.

Project Implementation Deploying efficient, trouble-free wireless systems in difficult radio environments calls for plenty of hands-on experience. For Arlanda's GSM 900 systems, Powerwave assumed full responsibility for designing, commissioning and optimizing the repeater network, saving network operators much time and effort in coordinating their operations.

Base Station Site The BTS site comprised of BTSs owned by three operators, as well as one shared Powerwave Base Station Master Unit (BMU).

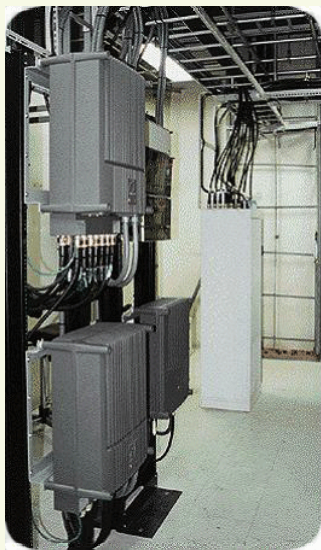
The BTS's fed the antennas covering the area around the site, as well as radiating cables covering the tunnel portions adjoining the site. A small fraction of outgoing power from each BTS was fed into the BMU, where RF signals were converted to laser light. Optical signals were distributed to several repeater sites inside the tunnels through a joint fiber optic network.

Fiber Optic Distribution Employing optical fiber for signal distribution allowed swift, economical expansion of the system, without creating difficulties relating to availability of transmission, donor signal strength, or antenna isolation.

Repeater Sites Repeater sites were comprised of one repeater for each operator, containing the unit that converts optical signals back to RF. The RF signals were then fed to the corresponding repeaters where they were amplified and redistributed independently to antennas covering platforms and stairways, and to the radiating cable covering the tunnels. Distance between repeater sites was approximately 1.1 km.

Network Management and Monitoring Powerwave network management software for repeaters enabled fault, performance, configuration and security management. The software gave each operator independent remote access to their portion of the repeater network. Performance parameters such as traffic statistics and other relevant data were available to each operator for monitoring.

Railway



Coverage Systems Innovations team are a team of RF-and system engineers within Powerwave who manage, or assist you in, your projects for cellular coverage worldwide.

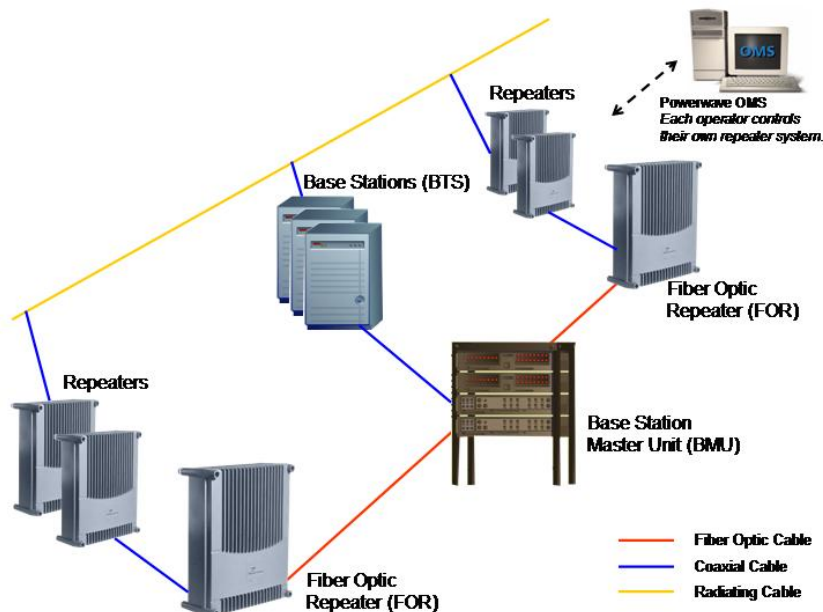
Increasing complexity of wireless systems today combines with regulatory restrictions and a variety of practical considerations to demand comprehensive experience and know how for cost-efficient cellular coverage solutions. Based on Powerwave's outstanding track record of customer projects completed, and on our extensive experience and know-how in wireless radio communications, Powerwave offers novel solutions that are carefully tailored to your specific needs.

Sustainability A significant difference between Powerwave and many other manufacturers is our consistent philosophy of designing products and systems capable of accommodating future requirements. The system installed at Arlanda conscientiously reflects this approach. Capacity upgrade. Thanks to our modular repeater design, additional GSM 900 channels and new bands, such as GSM 1800 or UMTS can easily be added to the existing equipment when necessary. New radio base stations are installed in the central equipment room. Channel selective repeaters provide full freedom to re-plan cell and frequency usage.

Minimizing costs All three network operators share the entire optical distribution network, including fiber, BMU, and optical-to-RF conversion units, thus minimizing initial investment and operating costs.

Additional savings are realized, thanks to an efficient system design employing only two fibers for the entire repeater network - one for downlink, the other for uplink.

System operation The initial investment is only part of the total cost. Powerwave's superior quality and reliable repeater solutions ensure continuous trouble free system availability, while minimizing service costs. Our outstanding service performance ensures complete customer satisfaction. In Arlanda, each operator was provided with comprehensive documentation for the entire system and for each of their specific, individual settings, enabling them to give service or implement modifications at any time.



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