Case Study – National Grid Wireless

National Grid Wireless, formerly the BBC Home Service Transmission Division, are a provider of wireless infrastructure and network services to broadcasters and telecommunications operators. They currently have approximately 3000 sites hosting equipment for Hutchison *3* (the UK 3G network), Vodafone, Orange, O2 and T-Mobile and had a requirement to provide a service to these users, charged on the basis of, amongst other things, the amount of power used on each site. Therefore a wireless meter reading solution was required. Additionally, as part of the value added service provided to their clients, national grid wireless had an additional requirement to be informed of loss of power to any of the sites so that interruptions to any site could be kept within the contractually agreed limits.

This solution was provided with a system based upon the NHDS Messenger 62 (M62) remote meter-reading and monitoring units. The M62 unit has 8 meter reading inputs and 8 digital inputs for monitoring alarms as well as the ability to monitor the mains supply. The unit uses the GSM mobile phone network to report to the host terminal system.

Initially, this system consisted of a single stand-alone PC running the Messenger host terminal software package and monitoring just under 1000 M62 units. This provided an initial trial system prior to going live with a system producing actual billing data for national grid wireless customers.

The system was soon expanded, however, to run on a central server with remote clients, and a direct link from the host terminal system to the Technical Operations Centre (TOC) system, a department responsible for 24/7 monitoring of the companies equipment and sites.

At this stage, the Messenger system was deemed a mission critical system, and had to achieve the standards of fault tolerance, redundancy and disaster recovery required of such systems within the company. To this end, a duplicate, system was installed at a backup site in Sutton Coldfield, so that in the event of a major disaster at the headquarters in Warwick, all operations could be brought back online from the Sutton Coldfield site, without loss of data.

System Description

The system is based around an Oracle 9 database running on a Windows 2000 based rack-mounted server.

Communications between M62 units and the system is carried out with another Windows 2000 based rack-mounted server, running the standard Messenger host terminal software configured as a modem server. This software is installed to run as a Windows "Service", thereby avoiding the need for the server to be logged on as any particular user. This allows the software to be loaded automatically in the event of the server rebooting without user intervention.

Actual communications is handled by the use of a number of GSM modems, connected to the modem server PC directly via a multi-port serial card. Future expansion of the system is likely to lead to a direct connection into the T-Mobile GSM network using a network pipe, thereby replacing the need for any actual modems.

The modem server also communicates directly with the TOC system by TCP/IP pipes. The server passes all relevant status and event data to two different addresses, one for the main TOC system located in the same building and one for the standby TOC system at the backup site at Sutton Coldfield. This provides the TOC team with information regarding site mains failures and restorations directly to their management system, eliminating the need to run a Messenger client system in the TOC department. The system also has the ability to automatically send SMS text messages to on-duty field staff responsible for investigating and correcting site faults. For information purposes, emails of such alarm events are also automatically generated and sent to the personnel responsible for installing and maintaining the Messenger units themselves.

Billing reports are created automatically at defined intervals and forwarded to relevant parties ready for forward billing to Crown Castle's own customers.

A number of client terminals, fitted with the standard Messenger host terminal software, are also used in the system. This is to enable relevant personnel to examine the current status of the Messenger units and to reprogram parameters and view/search historical archives of system events.

A duplicate database server and modem server are located at the Sutton Coldfield backup site ready to take over operations whenever required. The database will soon be linked to the main database server as a replicated database, where the data is kept in step with the main database so the two systems can run in parallel, and hand-over to the standby system will be seamless.

The diagram below shows how the National grid wireless Messenger host system fits together.
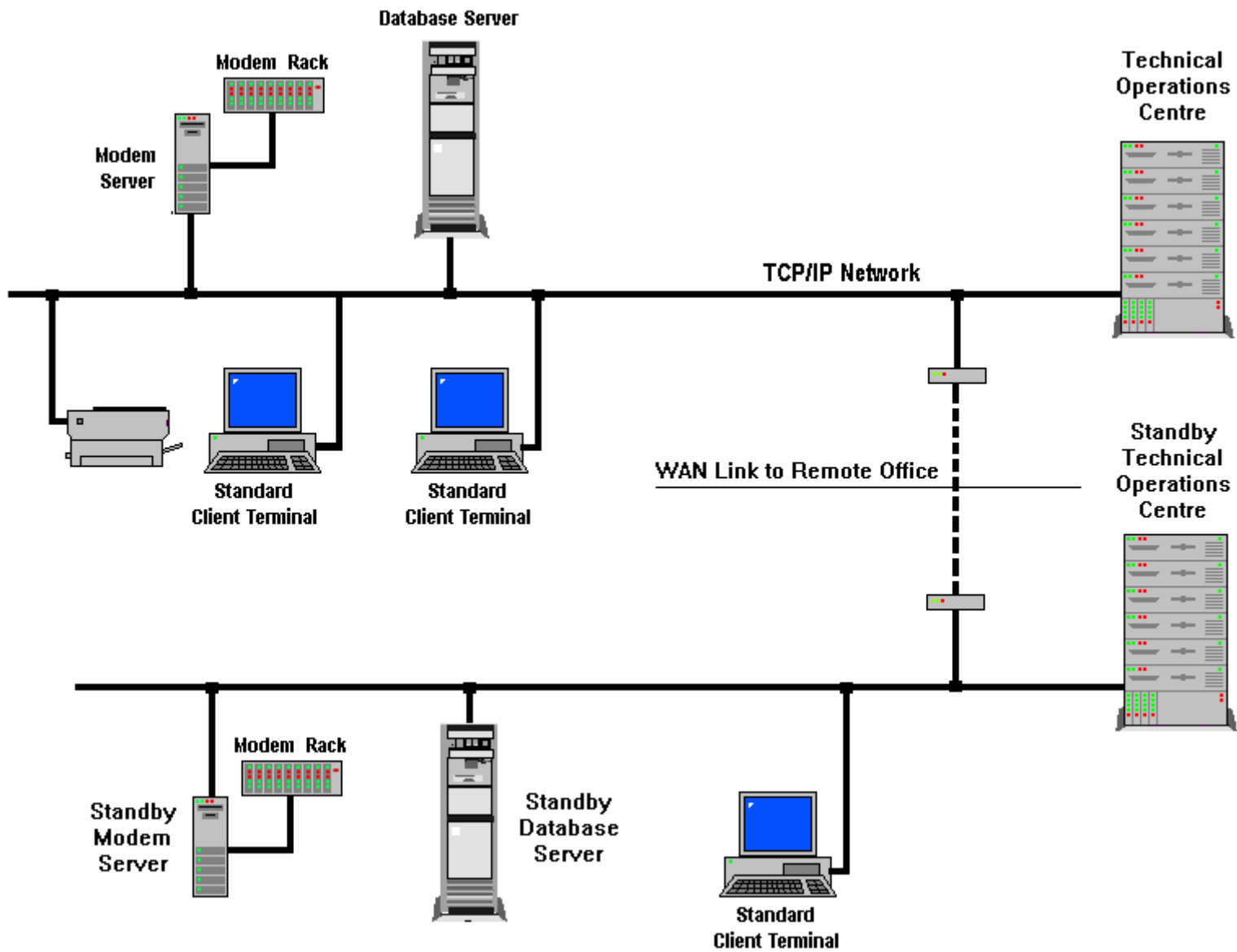
The individual of elements of this system are as follows:

Database Server

This is the heart of the system where all the status and historical data is stored. This is comprised of an Oracle 9 database management system running on a Windows 2000 server PC.

Modem Servers

The system contains 2 modem servers, one on the main site and one on the backup site, to receive and make calls from/to the M62 units. Each server consists of the standard host terminal software installed on a Windows 2000 server PC mounted in a rack. The software is installed as a Windows "Service" to avoid the need for user intervention in server power up or the need for a server to be logged on for the software to run.

Although these terminals are not used with permanent monitors or keyboards, as they are unmanned, they can be used as standard client terminals if desired.

Standard Client Terminals

The standard client terminal software is used to provide system status and the viewing of historical event data. Client terminals in this system are usually used in an ad-hoc basis, where the software is run on demand.

Technical Operation Centre

The Technical Operations Centre (TOC) is the national grid wireless department responsible for maintaining 24/7 monitoring of national grid wireless equipment and sites. Two TCPI/IP pipes are established from each of the modem servers to the TOC management systems (both the main system and the backup system at Sutton Coldfield) to pass information regarding the loss or recovery of power from monitored M62 sites.