

PROJECT SUMMARY (500 WORDS) :

Communication in mines need to be improved and upgraded to ensure safety to the miners underground and maintaining a set of safety standards in the underground environment. Administrative control is usually exercised from the surface through control offices that fix work intervals and continuously monitor the safety conditions underground. The communication standards in most mines are primitive and archaic.

The aim of this project is to establish a surface to underground ethernet network for routine paging, alarms and also an additional wireless connectivity to establish email transfers between the miners underground and the control office on the surface. The network is based on the eZ80F91 microcontroller board with ethernet connectivity. A unique application introduced in this system is an RS232 port on the ez80F91 module interfaced to a Radio Modem to offer wireless connectivity of more than 50 -100 metres inside the tunnel. A remote RF Modem with a PC aids miners inside the tunnel to access the ethernet controller and route email messages to the control office on the surface. Email bulletins of work flow and safety conditions are routed to the surface.

Tunnel Access - Another requirement for the system was to accommodate the many branches of the mine. Whereas tunnels generally have a single entrance and exit a mine has several sections that branch in different directions. Alarms/Paging Bells are installed at each branch to allow paging of a section of the mine. The project demonstrates the paging/alarm functions through LED's triggered through one of the ports. The alarm/paging activation is carried out from the control office on the surface.

Why Ethernet? An Ethernet is intended for the mines to the conventional wired telephony in order to communicate with underground PLC and automation systems. Because such a connection has the potential for broader applications in the industry, this project discusses specifically how the Ethernet link from the surface to the underground can be set up using an embedded server based on the eZ80 Acclaim chip the eZ80F91.

A reliable communications link between the surface control and the underground miners is a basic prerequisite for this mine communication network. The main requirement is that the link must support the increasing bandwidth requirements of a modern control system, including data from intelligent sensors and video equipment, which is beyond the capacity of existing cable-based asynchronous serial communications systems.

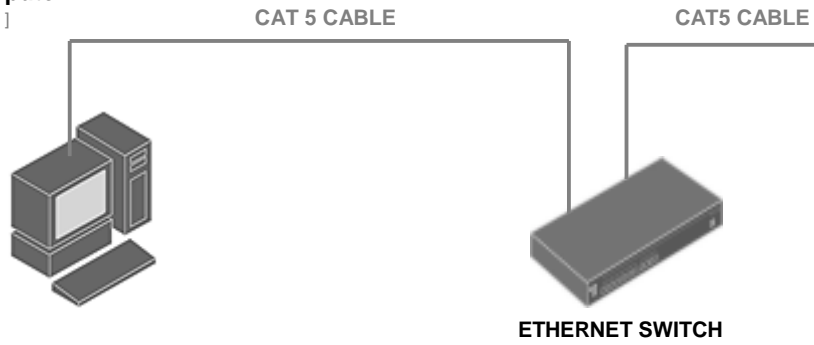
Network Topology

The Mine Z-Net has a "wired" Ethernet connection from the surface to the underground with optical fibre or category 5 Ethernet cabling (100base T) providing the physical connection. The main issue for this project is the Control to Underground Miner Ethernet segment. Significant technology developments would be required to achieve Ethernet-grade communications over the shearer cable so, given the time constraints of the project, a Ethernet (802.3x) system has been envisaged and intended for a trial in a coal mine to provide connectivity from surface to underground.

SYSTEM BLOCK DIAGRAM :

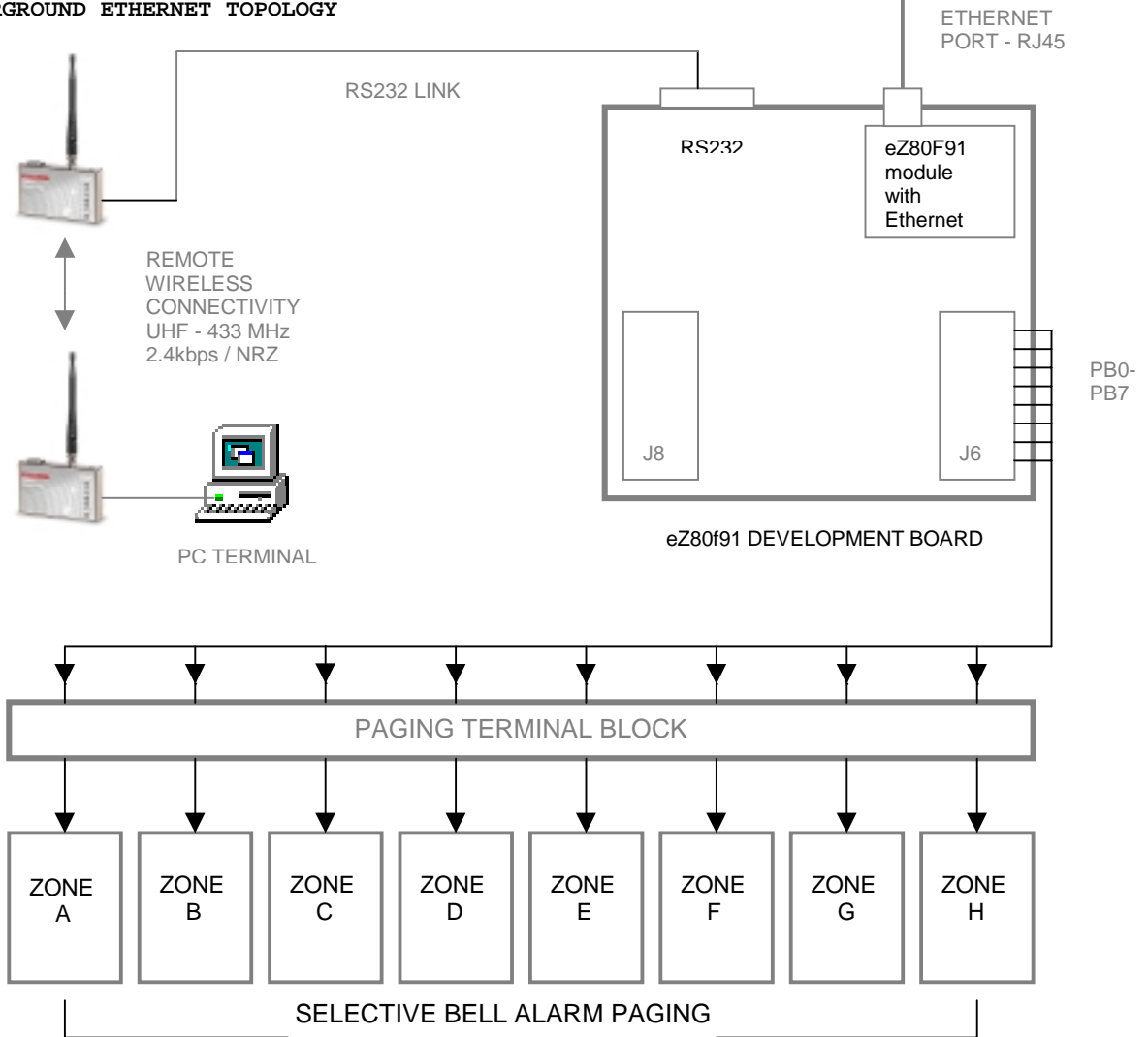
Surface Computer

[WORK STATION]

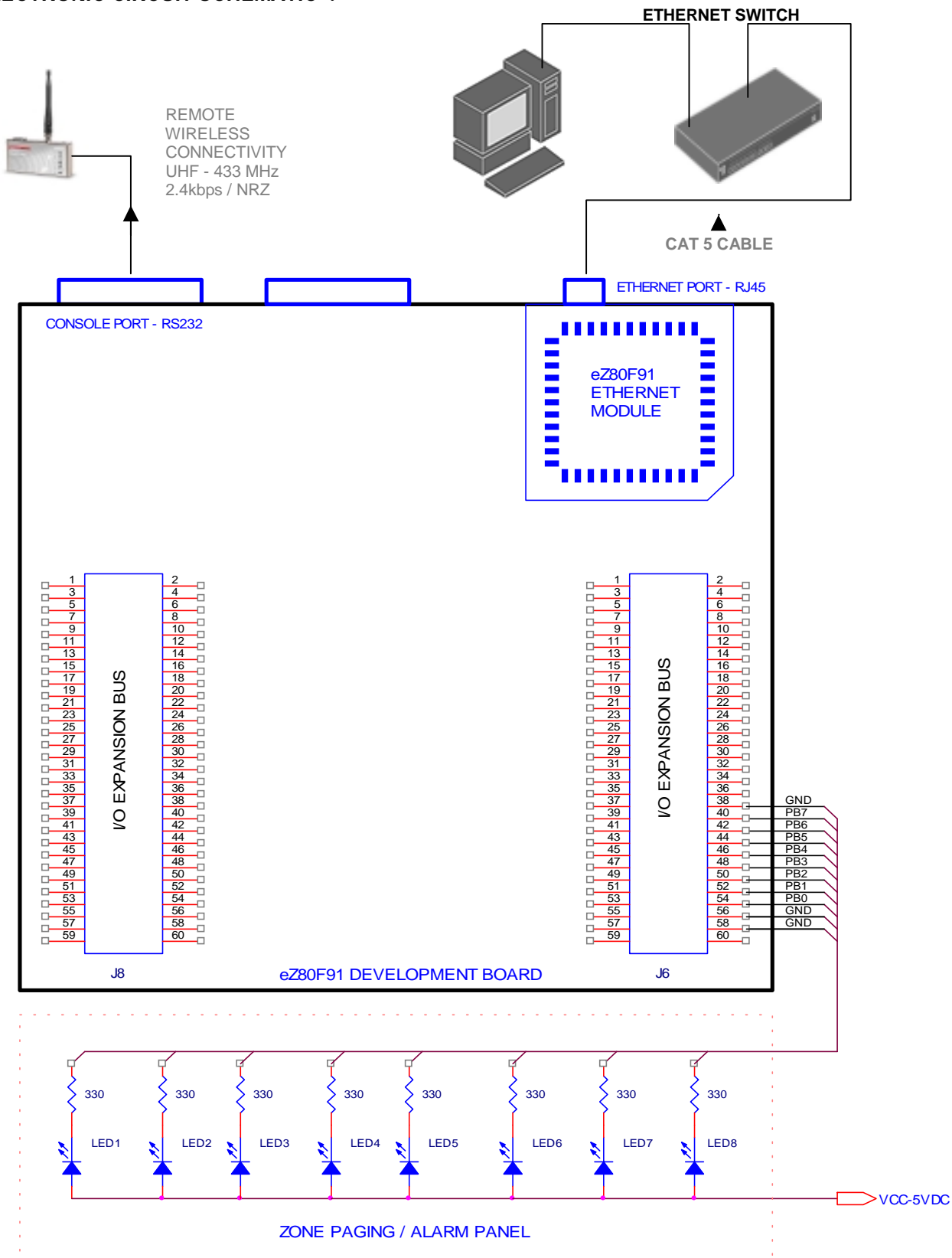


SURFACE ETHERNET TOPOLOGY

UNDERGROUND ETHERNET TOPOLOGY



ELECTRONIC CIRCUIT SCHEMATIC :



DEVELOPMENT BOARD SCHEMATICS, REFER TO SCHEMATIC ,eZ80F91 DEVELOPMENT BOARD, USER MANUAL eZ80f910200ZC0

1. ALL RESISTANCES IN OHMS, 1/4 WATT
2. ALL CAPACITANCES IN FARADS
3. VDD SUPPLY IS 3.3 VDC
4. POWER SUPPLY TO THE DEV. BOARD IS 9 VDC

ZILOG 2004 FLASH NETS CASH DESIGN CONTEST			
Title			
MINE Z - NET			
Size	Document Number	PROJECT NO. eZ2950	Rev 1
Date:	Sunday, September 19, 2004	Sheet 1 of 1	

PROGRAM SOURCECODE :

The sourcecode contains the project files as follows :

- Assembly (*.asm) files
- C (*.c) files
- Header (*.h) files
- HTML (*.htm) files
- Java (*.class) files

The entire sourcecode consisting of all the project files are located in the folder Project eZ2950_ZTP Suite. The main project files for the Mine Z- Net are as follows :

[boot.asm](#)
[EZ80_HW_Config.c](#)
[initialization.c](#)
[input_cgi.c](#)
[ipw_ez80.c](#)
[java_control_cgi.c](#)
[LCD_API.port.c](#)
[main.c](#)
[switches_cgi.c](#)
[tstat_control_cgi.c](#)

with their external dependencies are contained in the subfolder **Demo**. The website files are contained in the subfolder **websiteAcclaim** with the main file, [website.c](#) and its dependencies. The htm files contained in this subfolder are as follows :

[applef.htm](#)
[cgi.htm](#)
[cgif.htm](#)
[control_page.htm](#)
[ez80f91.htm](#)
[footer.htm](#)
[header.htm](#)
[indexf.htm](#)
[javaapplets.htm](#)
[javascriptf.htm](#)
[javascripts.htm](#)
[jcontrol_page.htm](#)
[left.htm](#)
[main.htm](#)
[overview.htm](#)
[overviewf.htm](#)
[siteinfo.htm](#)
[siteinfof.htm](#)
[tcpip.htm](#)
[Thermostat.htm](#)
[Thermostatf.htm](#)

