RADIO DIAL-IN CONNECTIVITY TO NT NETWORKS

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ISM, a Member of IBM Global Services

1 Preface

"Global-village is the world viewed as a community in which distance and isolation have been dramatically reduced by electronic media"; *Item #307 (11 Dec 1998 05:00) - global village: M-W's Word of the Day; Web:* http://listserv.webster.m-w.com/SCRIPTS/WA-MERRIAM.EXE?A2=ind9812B&L=MW-WOD&P=R242

This paper discusses a limited case study of a specialized use of Windows NT dial-in connectivity to create a global village. Namely a radio link to a telco dial-in connection with a remote modem for network connectivity.

2 Abstract

Figure 1 - Travel on muskeg to Behan Compressor Station

2.1 Requirements for Network Access

It's 9 am on a cold January morning. George Walls, a TransCanada measurement tech, is sitting in the Behan Compressor Station waiting for the sun to come up. He just arrived after a 40 minute helicopter ride over the muskeg from the nearest road. Once the sun is up he'll calibrate the meter run at the station, but that's still several hours away since there's only 3 hours of daylight today.

He starts his PC and waits until the screen displays "User Name Verified". Now he can read his e-mail, do his expenses, submit his overtime and generally keep himself preoccupied while he waits in the dark. For George, the availability of the NT network is critical to his productivity, personal mental state and the company's productivity.

2.2 Site Locations and Communications Methodologies

The sites are generally located in the top half of Alberta, Canada and isolated by the lack of any communications methods other than a radio link to the nearest telephone connectivity point. Because of topology and costs, microwave is not a viable option and it's normally many miles to the nearest landline connection. Some of these connectivity points are telephone company sites and others are shared by companies who have similar communications problems. See Appendix A for a high level block diagram of the communications flow.

2.3 Limitations

Being a data radio link, the speed is restricted to 19200 baud. Since it is a dial-in the receiving modem has a 20-minute inactivity monitor and will drop the line after this time. The main limitation to connectivity is the time waiting for things to happen because of the relatively slow speed running Microsoft Outlook, SAP, Netscape etc.

As a security policy, the company has restricted dial-in access to their internal web only.

Any upgrades to the communications hardware or firmware have to be co-ordinated with the computing support areas to ensure that the system integrity is maintained.

2.4 Reliability Requirements

Data transferred over this link can affect billing to TCPL's customers. Problems of this type set the priority of the access to high, which is a 2-day response time for these sites. Generally, most of the problems are not of this nature, so that problem response time is from 2 weeks to a month for non-business-critical problems. Reliability of the communications at these sites varies. Some sites require a maintenance visit as little as once a year, while others tend to have up to 8 visits a year. Differences in weather conditions such as high wind areas, power stability and grounding conditions are key factors that affect this reliability.

3   System Operating Parameters

3.1   NT Configurations

The operating system is NT4.0 with Service Pack 2. RAS setup has UnimodemEnable=0. This is added to REGEDT32.EXE so that it enables the MODEM.INF file in C:\WINNT\SYSTEM32\RAS directory. This file has to be edited first for the modem type we used, In the same directory, SERIAL.INI must be blank with a single carriage return and RASPHONE.PBK will be edited from the Dial-up Networking Icon in My Computer.

3.2   Hardware configurations

A range of manufacturers hardware was used, although primarily Compaq or IBM Pentium 133 MHz or 166 MHz desktop PCs are used. The connection is direct connect with a serial cable to the data radio interface. This connection had to have pins 7 to 8 tied together so that RAS would recognize the link since the modem was at the other end of the radio link.

3.3   Software Configurations

Attached as Appendix B is a set of the instructions we use for the setup procedures for this environment. The target user for these instructions is an IS type person familiar with our NT and normal dial-in configuration, so some of the steps are combined and some actions are implied. We didn't want to make this into a 3 ring 2 inch binder.

The gist of the work is to ensure that all references to modem operating speeds are set to 19200 baud. This includes MODEM.INF and RASPHONE.PBK. Additionally, the Control Panel/Modem setting has to be set with speed of 19200 baud, Error Control and Flow Control OFF in the Connection/Advanced area of the modem properties. The reason we do this is to preclude the software sending any parameter changes to the modem as the parameters set by the Automation technicians in the modems at the other end of the radio link are critical to reliable operation of the radio interface.

It can also be noted that the modem properties used are for the AT&T Comsphere3810 Plus. Although other types of AT&T modems are actually used at various locations, the 3810 Plus initialization parameters worked more consistently than any of the others.

3.4   Network Configuration

The Network connection end of the dial-in is a modem bank connected to a Cisco router. Authentication for access is twofold. First, access to the network is validated with a POP3 authentication and then the NT name and password are authenticated for the domain. This double authentication seems to provide reasonable security for dial-in as the only address the can be traced on the network is the answering end of the modem bank. (Note this is the company standard dial-in service)

4   Installation Problems and Solutions

4.1   Problems noted during dial-in

4.1.1   Special Wiring requirements

The 9-pin connector on the COM port 9 pin connection must have pins 7 and 8 cross-connected to allow the RTS/CTS control to work properly on the PC. Please see Appendix C for the signalling configuration of 9 pin to 24 pin modem connections.

4.1.2   Registry Change

The only change is to disable the Unimodem default configuration for RAS, which enables MODEM.INF as the location for modem configurations based on the type selected. (see Appendix B for change details)

4.1.3   RAS file changes

Before the above changes are done, and Service Pack 2 is reloaded , the C:\WINNT\SYSTEM32\RAZ\SERIAL.INI file must be checked to ensure that it is empty. Another critical file which should be checked is C:\WINNT\SYSTEM32\RAS\MODEM.INF for the specified modem to ensure that the initialization string in use does not reset the modem parameters. These had to be custom configured at the modem site at the end of the radio link for the telco interface at that site. This was done in our case study by Trans Canada 's Automation technicians who are trained in this environment.

4.2   Order of work critical

Appendix A is the definitive list of tasks associated with setting up our Comsphere modem for the Radio Link dial-in sites. The order of the tasks is critical, for example if one changes the Modem.inf file, RAS needs to be reloaded and Service Pack 2 rerun.

4.3 File References

C:\winnt\system32\ras\modem.inf
C:\winnt\system32\ras\serial.ini
C:\winnt\system32\ras\rasphone.pbk
C:\winnt\system32\ras\switch.inf
Registry via c:\winnt\system32\Regedt32.exe

5   Results, Learnings & Challenges

This limited case study was not a test. These were all real operational situations which had to work. The result was that, to date, all of these locations are up and operational on a day-to-day basis and they provide the network connectivity needed to meet Trans Canada's business requirements. The primary learning from this experience is that in a networked environment, it takes a range of knowledge and skills to establish and maintain the integrity of the communications. Many people with diverse skill sets are often required to work together to ensure that even the most remote user has the access required to do his or her job effectively. In our case, it was Windows NT skills, communications integration skills, radio connectivity skills, and most important, people skills to bring it all together.

The challenges are to maintain the integrity of this connectivity as software and hardware upgrades are implemented. Such as the implementation of WindowsNT Service Pack 4. An ongoing challenge is to understand and, if possible, control the exact signal expectations of WindowsNT RAS service as it passes in and out of the COM port to the modem.

Respectfully submitted,
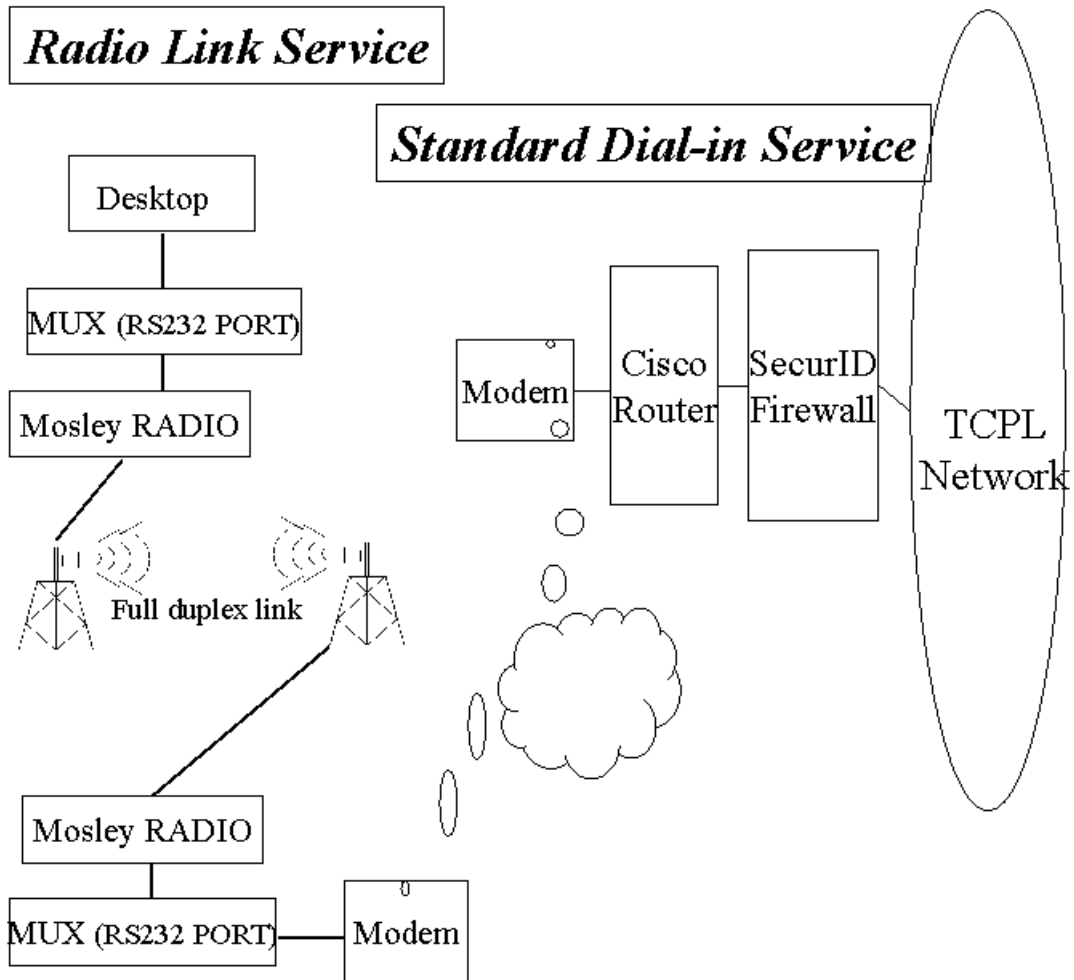   Kenneth O. May, P Eng

Appendix A

Radio Link Service

Desktop

MUX (RS232 PORT)

Mosley RADIO

Full duplex link

Mosley RADIO

MUX (RS232 PORT)   Modem

Standard Dial-in Service

Modem

Cisco Router

SecurID Firewall

TCPL Network

Appendix B

DIAL-UP Networking Configuration Setup for Radio Linked Sites.

Follow the RAS setup steps outlined on page 2-41 Titled Installing RAS (for Telecommuters).
* Note: IF RAS detects a **Standard Modem** - just continue. The modem will be manually changed later

The following procedure will replace the steps from Step 13 and onward.

At step 13 Restart the PC/ LAPTOP.
*Note: RAS needs to be configured to use the Modem.inf instead of the Unimodem.
*Warning: BE CAREFUL in editing the following Registry Entries.

1. Click on **Start**
2. Goto **Run,** type in **Regedt32** in the command box and press Enter.
    - Select **Hkey_Local_Machine**
    - Click on **Software**
    - Click on **Microsoft**
    - Click on **RAS**
    - Click on **Protocols**
    - From the Menu bar select **EDIT** and then **ADD VALUE**
    - In the Value Name box type in **EnableUnimodem**
        - ➢ **NOTE: The above IS case sensitive with NO spaces**.
    - In the Data type box change to **REG_DWORD**
    - In the **DWORD** editor window type in **0**(zero) as the data
    - Click **OK**
    - Close **Regedt32**
3. Goto **Control Panel** and click on the **MODEMS** icon
4. Remove the Modem that was found by RAS at setup.
5. If there is a prompt to update RAS select **YES**
6. Now **RESTART** the computer.
7. If there is a prompt to detect the modem go **CANCEL**
8. Once the computer is back up **Log on** and double click on **Dial-Up Networking**
9. This will cause **RAS** to Prompt for a Modem
10. When asked to auto detect the Modem click **NO**

11. From the Configure Port Window select the **AT&T Comsphere 3810 PLUS 288**
12. Under the **Port Usage** select the **Dial out** and **Receive** calls option
13. Click **OK**
14. Click **Continue**
15. At the RAS Server TCP/IP Configuration window click **OK**
16. At the RAS Server IPX Configuration window click **OK**
17. At the Windows NT Setup window type in the path to the I386 folder. Typically **C:\NTDRIVER\I386**
18. From the RIP for NWLink IPX Configuration window select **NO**
19. Close any windows and **RESTART** the computer (Note: The Event Viewer will display the following error when Windows NT restarts. "The RIP for NWLink IPX service failed to start due to the following error: The parameter is incorrect.") Ignore this. Reinstalling SP2 will solve the problem.
20. Once the computer is back up **Log on** and Reapply Service Pack 2
21. In the **NTDRIVER** folder open the **SP2/BATCH** folder and double click on **SP2LAP.BAT** for both Desktops and Laptops. This is because the **SP2LAP.BAT** includes updates to the RAS system which are not included in the **SP2DESK.BAT.**
22. When this is done the computer will prompt you to **REBOOT** select **YES**
23. After **SP2** is reinstalled check for the following:
    - Set the modem speed to 19200 bps in the following places
        - ➢ Go to Control Panel - Modem.
        - ➢ Under the General Folder, make sure that you have the correct modem installed and NOT Standard Modem. If you still have Standard Modem - Remove and Add back the correct modem.
        - ➢ Click on Properties and Set the Maximum speed to 19200.
        - ➢ Click on <OK>.
        - ➢ GO TO My Computer then Double Click Dial-Up Networking.
        - ➢ Select the appropriate phone entry (ex. Long Distance NGTL without

'9') If the phone book entries aren't standard, add an updated copy of RASPHONE.PBK.

➢ Click on <More>
➢ Click on <Edit entry and modem properties>
➢ Click on <Configure> beside the Dialin using line.
➢ Set Initial speed (bps) to 19200
➢ Click on <OK>

23. Set the Frame Type of the NWLink IPX/SPX Compatible transport to Ethernet 802.3

- Go to Control Panel - Network
- Click on the Protocols Folder
- Click on NWLink IPX/SPX Compatible Transport
- Click on Properties
- Change Frame Type to Ethernet 802.3
- Click on <Apply>
- Click on <OK>

24. Make sure that the Enable IP Forwarding check box under the Routing Folder of the Microsoft TCP/IP Properties is NOT Checked.

- Go to Control Panel - Network
- Click on the Protocols Folder
- Click on TCP/IP Protocol
- Click on Properties
- Click on the Routing folder
- The box beside Enable IP Forwarding should NOT be checked.
- Click on <Apply>
- Click on <OK>

25. At the Network Settings Change window, click on <YES> to restart the computer.
Check in C:WINNT\SYSTEM32\RAS, that SERIAL.INI in blank, and the SWITCH.INF file is for Calgary Dial-in Server. If not copy these files to this directory before starting the dial-in function.
After the PC has restarted continue with pages 2-42 and 2-43 to complete the setup.

NOTE:
1. Although all of this can be done in advance at a LAN site, you may find that it needs to be redone when your on-site. Generally, one would start over by removing the RAS COM-port and adding it in. Then continue with the rest of the install.

2. If the PC is connected into the building wiring which only has 6 wires, the 9-pin connector on the COM port must have pins 7 and 8 cross-connected to allow the RTS/CTS control to work properly on the PC.

Appendix C

9 -Pin Cabling for Mosley Radio sites.

The following table shows how to connect a 9-pin serial port connection on a computer to a 25-pin connector on a modem. Again, if you are using an off-the-shelf cable, be sure all the pins are connected as shown in the table.

Note that some modems have the Data Set Ready (DSR) signal physically tied to the Data Carrier Detect (DCD) signal. Some 1220-bps modems and other 2400-bps modems have dip switches default to this setting as well. As a result. If such a modem loses power while listening for a call, the Remote Access server cannot detect the condition because the DSR will not change as it does with other modems.

9-pin serial port	25-pin modem connection	Signal	Notes
1	8	Carrier Detect	
2	3	Receive Data	
3	2	Transmit Data	
4	20	Data Terminal Ready	
5	7	Signal Ground	
6	6	Data Set Ready	
7	4	Request to Send	Mosley tie 7-8 together on 9-pin
8	5	Clear To Send	Mosley tie 7-8 together on 9-pin
9	22	Ring Indicator	Optional

Figure 1 - 9 pin to 25 pin chart