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Data_Link 2000

APPLICATION NOTE AN014
Dual Communications

Summary

The upgrade for dual communications provides increased system integrity by ensuring that the failure of a communication path can be tolerated without compromising the system. It provides dual redundancy, whereby both paths are used all the time, so failure of either will be immediately detected, but will not stop the system functioning. This offers obvious advantages over main/standby operation, where failure of the standby path would not be detected until the system switches to it.

The feature can be used to give dual communications by radio and leased line, for additional security. It can also be used to configure a system to operate on two radio channels to give increased immunity to failure due to radio interference.

The functionality can be applied to any *Micro_Link* units by adding a Comms Expansion module and installing a firmware upgrade (it is not currently available for use on *Nano_Link*). If the user want to access the relevant alarm flags he will also need to upgrade the configuration software on his computer to DCD Version 2.17 or later.

The Comms Expansion module connects via the I/O_Link bus in the same way as any other expansion modules. Furthermore, it uses the same mechanical construction.

Any combination of communication media can be used (except GSM). For example, the *Micro_Link* could be fitted with a radio and the Comms Expansion module with a leased line modem.

When the upgrade is applied, the *Micro_Link* will transmit on both paths, and listen for incoming messages on both paths. If it fails to receive messages on one path it will generate a 'Dual Comms Fail' alarm, but keep functioning on the other path. It will simultaneously raise an 'Expansion Comms Fail' alarm if the fault is with the Comms Expansion module. This applies equally to *Micro_Link*'s configured as outstations, repeaters or base-stations.

The functionality can be partially applied to a system. If some outstations are not fitted with the Dual Comms facility they will still function as normal.

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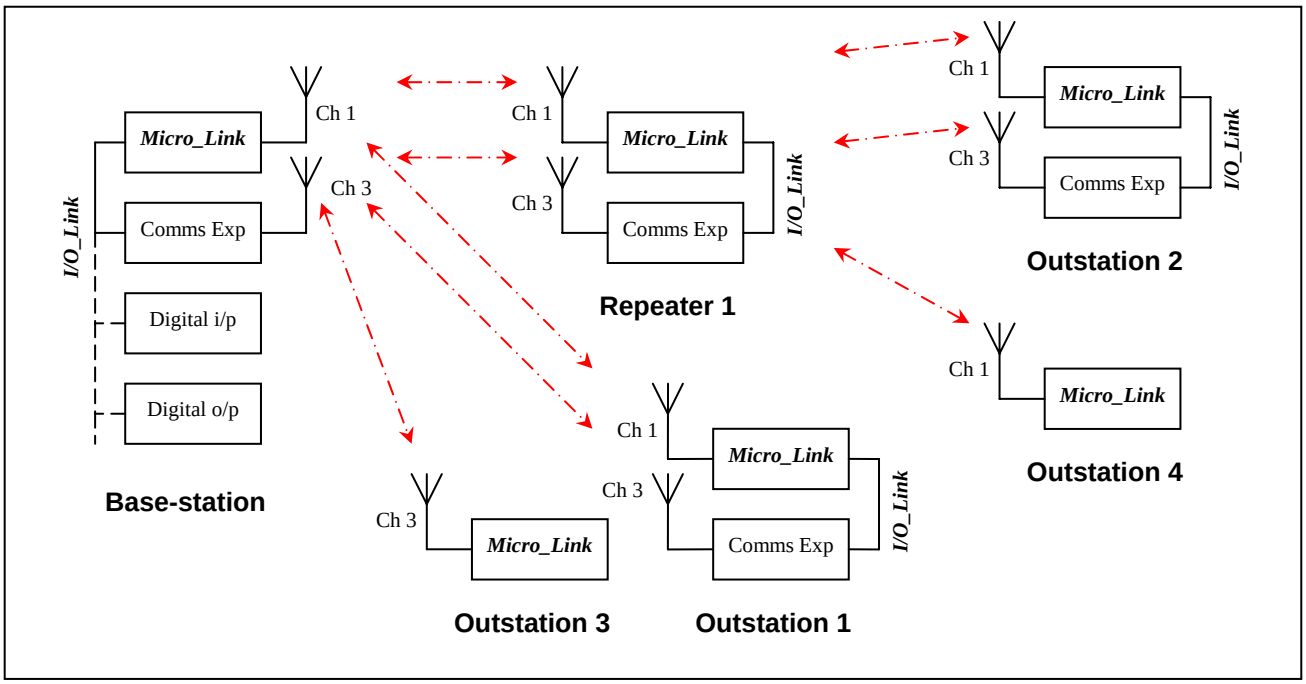

In this illustration the base-station, the repeater and outstations 1 & 2 are equipped with the dual comms facility. It is assumed that all ***Micro_Link***'s except Outstation 3 have radios set to channel 1 and all comms expansion modules, plus Outstation 3, have radios set to channel 3. Note that the scenario could equally be that leased line modems are used in place of radio channel 3, for example.

When the base-station sends a command to outstation 1 it transmits on both channel 1 and channel 3. Outstation 1 recognises that it both channels have received the command, and sends its response, again on both channels. The base-station recognises both messages and clears any alarms relating to outstation 1.

When the base-station sends a command to outstation 2 it transmits on both channel 1 and channel 3. The repeater forwards the message, again on both channels. Outstation 1 recognises that it both channels have received the command, and sends its response, again on both channels. The repeater forwards both to the base-station, which then knows that both channels are fully working.

When the base-station sends a command to outstation 3 it again transmits on both channels. However, the outstation is not equipped with dual comms, so only sees channel 3. It responds normally, sending a reply on channel 3. The base-station recognises the response, but raises a 'Dual Comms Fail' alarm. Since the 'fault' is not on the comms expansion module it doesn't raise an 'Expansion Comms Fail' alarm. The system designer will obviously know that this is expected, so will not use the Outstation 3 Dual Comms Fail Alarm flag.

Outstation 4 is a combination of the previous scenarios, but it is assumed that its radio is set to channel 1. The base-station will therefore raise both a 'Dual Comms Fail' alarm and an 'Expansion Comms Fail' alarm. Again, the system designer should ignore these, since he knows they will be generated.

As well as providing alarms flags for each outstation, the base-station also generates common alarms, to indicate that at least one outstation channel has failed. In this example these alarm flags cannot be used, since there is a permanent partial failure because not all outstations are equipped with dual comms.

If a 'Comms Fail' alarm is needed at an outstation the usual process can be applied, namely including in the base-station configuration the line:

```
Outstation 1 Dual Comms Fail ->
                    Outstation 1 Digital Output 8
```

And in the relevant outstation the line:

```
Value on Comms Fail = 0 ->
                    Local Digital Output 8
```

If a 'Dual Comms Fail' alarm output is required at an outstation the base-station configuration must include a line such as:

```
Outstation 1 Dual Comms Fail ->
                    Outstation 1 Digital Output 7
```

If there is a complete comms failure the base-station would be unable to send alarm flags to the outstation, so some external logic processing may be needed to decipher the alarm flags.

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