# Suggested Installation Procedure

It is suggested that the software is installed before any hardware is set up.

## Minimum Requirements:

For IDRANet only functionality:

- PC Hardware: native RS232 port **(NOT USB/RS232 adaptor)**, 300Mhz, 128Mb RAM, 60Mb free disk space.
- Operating system: Microsoft Windows 98SE/ME/XP.

To use the full functionality of Cortex e.g. IDRANet, Telephone, Multiple Cameras, E-mail, Speech Recognition, IDRANet-Bridge, Auto-updates, etc., we recommend:

- PC Hardware: 2x native RS232 ports **(NOT USB/RS232 adaptor)**, 2.4GHz or better processor, 512Mb or more RAM,
- Operating system: Microsoft Windows XP.
- Voice modem.
- Broadband Internet connection.
- Video Capture card (for non-usb Video cameras) e.g. IVC-200.

Note: Multiple cameras, High frame rates, High resolution, pre-event recording, motion detection and network streaming all demand high CPU usage. The use of a fast processor, high performance graphics card and large memory is therefore recommended.

**1) Install MS speech engines.**

a) It is recommended but not necessary that you install the MS SAPI4 speech engines and support files before you install Cortex. Any other SAPI4 compliant engines already existing on your PC will also be available to Cortex. These files are available from **http://www.idratek.com/DLSoftware.htm**. The engines are redistributed from Microsoft and you must therefore agree to their terms and conditions in order to complete this installation.

**2) Install Cortex**

a) Before you can install Cortex you must first obtain an Install Key from IDRATEK. It is supplied free and may be obtained on request from **Cortex.support@Idratek.com**. This allows 30 days evaluation operation.

b) The Cortex install program (CortexSetup.exe) can be downloaded from the IDRATEK web site at **http://www.idratek.com/DLSoftware.htm**. Once downloaded, run the program and follow the instructions inserting the install key when specified.

**3) Configure/Register Cortex**

When Cortex has been successfully installed you must spend a little time configuring the various options. First launch the application from the desktop icon. You can then find further instructions in the Cortex help menu, How to ? Topics, Getting started.

**4) Set up and connect the IDRANet hardware**

This process depends on the components that you are using. See the starter kit installation guide for example guidelines.

# Starter kit installation guide

The following is based on the use of an introductory kit but the principles are applicable to any network setup.

The introductory kit typically includes the following items:

- PCIF module (either PCA or PCD with suitable PC connecting lead)
- MPD module (provides bus loading circuits, power supply connection point and 4 network connections)
- DRB module (power switching, LEDs, buttons, digital inputs)
- ITR module (IR remote control transceiver)
- IDRANet connectors
- 12-15V regulated DC power supply.

Cortex trial version and various support files can be downloaded for free from:
**http://www.idratek.com/DLSoftware.htm**
(Allows 30 day full feature trial period. Simple network interface functions remain free after)

Before starting any work on the physical network it is advisable to have installed the Cortex application on a suitable PC so that it is ready to be used for the following exercises. The user should refer to the Cortex installation and set up guide if not already done so.

## Implementing the basic network structure

It is advisable to start with the wiring. It is possible to connect all three active modules to the MPD using a single cable with 3 'T' junctions (ie. Using 4 terminal block plugs). Alternatively, since the MPD provides 4 connection headers, the user may find it more convenient for experimentation purposes to make up three separate connection leads (using 6 terminal block plugs), and in the following it is assumed that this method is chosen. The 3 network cables will then be used to connect the 3 active modules to the MPD unit and thus to each other and to the power supply. The wiring guidelines should be observed when constructing the cables.

Once the cables have been checked for correct wiring, these should be plugged into the MPD module. The PCIF (PCA or PCD) module should be connected to one of the IDRANet cables and also to the PC using the supplied RS232 interface lead. **None of the other modules should be attached at this stage and network power should remain switched off.**

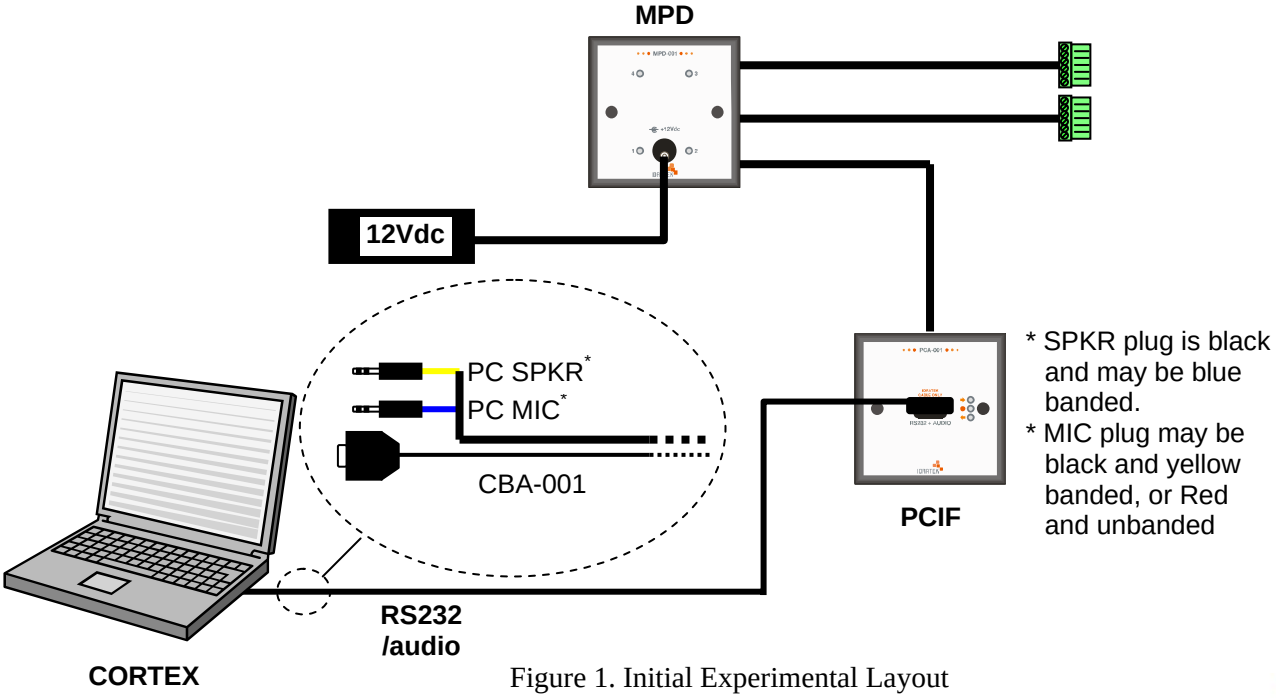



Figure 1. Initial Experimental Layout

# Commissioning New Modules

All newly purchased modules are provided in an uncommissioned or 'virgin' state. This means that the modules are not programmed to perform any specific function and also, very importantly, that their individual identity parameters (eg. network addresses) are at factory default values. In particular, the default Node Identity (NID) parameter is FFFE (hexadecimal) for all new modules. This means that it is important to commission the modules on to the network one at a time. Note that it is possible to recover from a situation where multiple uncommissioned nodes (modules) exist on the same network but this is a somewhat tedious task and should not be used as a means of avoiding an orderly commissioning process.

The commissioning process can be performed manually ie. by sending direct command packets to a newly connected module, however it is more convenient to use the Cortex guided method. In order to use the Cortex approach, the user must first gain some experience with the Cortex application and how it is used to construct a database representation of the network.

Therefore before proceeding with the addition of modules to the structure shown in figure 1 or even powering up, the user should first refer to the Cortex Help menu, How to ? Topics, How to build a database. The help instructions will guide the user through the process of building up a graphical and structural representation of a network and eventually will lead on to the commissioning of physical modules using the example of a starter kit.

The Cortex help documentation also provides examples of both Reflex level and Cortex level programming based on the starter kit modules, however the same principles can be used to work with other modules

# IDRANet Wiring Guidlines

## CABLE TYPE

CAT5 or similar - either solid or stranded core. The latter is easier to work with.
Shielded variants are not necessary but may protect the analogue audio bus in noisy environments. They are also recommended for long network runs eg. >100m

## COLOUR CODING SCHEMES

| Signal | IDRANet Terminal Blk | Solid/Stranded Core Typical | Stranded Core Belden Type |
|---|---|---|---|
| | | | |
| **Audio Bus L** | **1** | **White/Green** | **Black** |
| **Audio Bus H** | **2** | **Green** | **Green** |
| | | | |
| **Digital Bus L** | **3** | **White/Blue** | **Black** |
| **Digital Bus H** | **4** | **Blue** | **Blue** |
| | | | |
| **Power 0V** | **5** | **White/Orange** | **Black** |
| **Power +12-15V** | **6** | **Orange** | **Red** |
| | | | |
| **Unused** | **-** | **Brown** | **White** |
| **Unused** | **-** | **White/Brown** | **Black** |

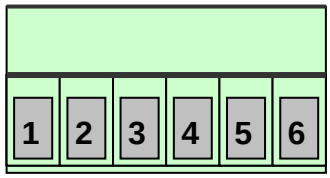
***Notes:***
***1) These are guidelines only for typical cable types. Adopting a standard scheme reduces the possibility of wiring errors when changes or additions are made at a later date. Where other colour schemes are imposed by different cable types, a clear indication of the scheme used should be clearly noted and posted in an appropriate location eg. adjacent to the power supply point. IT IS HOWEVER IMPORTANT THAT EACH BUS USES A TWISTED PAIR***

***2) A possible use for the unused pair is to team up with the power pair to increase current delivery capacity, however since this is a departure from the guidelines then it is good practice to note and post this type of usage in an appropriate location as in 1) above.***

## IDRANet 6 WAY TERMINAL BLOCK CONNECTIONS

| Signal | Terminal |
|---|---|
| | |
| **Audio Bus L** | **1** |
| **Audio Bus H** | **2** |
| | |
| **Digital Bus L** | **3** |
| **Digital Bus H** | **4** |
| | |
| **Power 0V** | **5** |
| **Power +12-15V** | **6** |
| | |

Terminal block plug
Wire entry side



# Wiring Considerations

For installation convenience, IDRATEK modules use a 3.5mm pitch 6 way terminal block plug and header arrangement. It is thus possible to terminate the module connection points with plugs and cover up pattress or backing boxes with a blanking plate until the modules are ready to install. This allows the wiring to be thoroughly checked before module installation and power up. IDRATEK do not currently provide a cable testing product but hope to do so in the future. Since IDRANet is a bus based network (rather than requiring a central router) the terminal block plugs allow daisy chain or 'T' connections to be created as required.

Although IDRANet is a 'free topology' network, some sensible considerations should be taken into account when planning the wiring.

At the baud rates currently implemented, cable runs of several hundred meters should pose no problems other than to current delivery. It is thus generally recommended that the structure is loosely radial with the power supply and shield earthing (if used) at the 'centre'. Note that though off-the-shelf 12V devices (such as 3rd party PIRs, smoke detectors etc) can derive power from the IDRANet power bus, the total operational current requirements should always be checked carefully. CAT 5 conductors are generally rated at 1A and the resistance tends to be in the region of 10ohms/100m (remember that this effectively means 20ohms/100m for a power pair).

IDRANet is a resilient protocol, nonetheless it is advisable to follow the same precautions as for any wired data transmission media. It is generally recommended that data carrying cables are not run immediately adjacent to mains cabling (eg. in same trunking). Generally speaking this means a separation of at least 15cm between long parallel runs of data and mains cables and ensuring that cabling to a mains connected module enters from opposite sides and does not cross over within the enclosure. Separations from mains cabling connecting fluorescent lighting or other 'high voltage' or 'spike' prone appliances should preferably be even greater. Systems utilising the audio bus may benefit from using shielded cable variants and should observe more carefully the recommended separation precautions.

Where Shielded Cat5 is used the shields between daisy chained segments should be connected to each other but not to a 0V or GND connection at that point. The shields should only be connected to GND at a 'central' point – typically at an MPD or IPS module. In other words the idea is to create a 'star' connectivity structure for the shields.

# Module Location Considerations

When planning the wiring structure it is advisable to consider aspects which might affect the choice of physical module location.

Mains Relay Switching

Though IDRATEK relay type modules can be placed at or near existing lighting switch locations or mains power outlets, this is not a necessary or in some cases desirable location. Depending on the existing cabling and the nature of the application, many different possibilities exist. Some users may wish to install 'in parallel' to existing lighting switches to allow a return to a non automated structure in the event of a network failure or network removal. Others may choose to perform the mains switching remotely and simply install a low voltage input (eg. push button only module) at the interaction point. Yet others may choose to locate all the switching modules at a central point in the style of conventional DIN rail type centralised structures.

Light Level Sensing

Inspite of diffusion effects, light level sensing modules essentially 'see' the object directly in front of them. For room lighting applications it is therefore best that these point at a light coloured wall or floor. Effects such as sunlight or other direct light sources entering the sensor at particular times of the day may be ameliorated by shielding or further diffusing the existing sensor window. For most applications the absolute light level is not important, only that the range and consistency characteristics suit that application.

IR TX & RX

IR receiver modules clearly require a good viewpoint so that the user can easily point a controller at them from any location within the room. Ceiling mounting is one option but shoulder level mounting on a wall is normally sufficient. Similarly IR transmitter modules should be located so that they have a good line of sight to the controlled equipment, or at least to some good secondary reflector. In most situations however the emitted power levels are sufficient to operate equipment via secondary reflections from ceilings, walls or other objects. Though more than one transmitter can be utilised per room, synchronicity is not guaranteed so programming will be required to ensure that only one module operates at any one time.

For additional convenience it is possible to connect external sensor or emitter devices. For a receiver application this may perhaps be used to allow the main body of the unit to be hidden (eg. Above ceiling) leaving only the small sensing device visible. For transmission purposes an external emitter allows closer control coupling to the desired appliance ie. preventing the possibility of occlusion eg. through movement of furniture or even persons walking within the room. Note though that external connections are limited to relatively short cables particular for the receiver.

Finally, though IR is generally confined to the local room, 'spill out' can occur between adjacent rooms. In certain situations and appliactions (eg. IR extender functions) this can cause a feedback loop with interesting if not desirable results! (Eg. IR entering a receiver in an adjacent room then being relayed by network to the transmitter in the other room, emitted and then spilling back into the receiver etc. etc.). However the powerful IDRANet protocol makes it possible to prevent this situation in most cases through suitable control of IR data flow addressing between networked devices.

Temperature Sensing

In order to make best use of the high resolution sensing capabilities it is very important to consider the factors that affect the measured temperature and mount the unit intelligently.

The sensor device is mounted at the lower end of the module (assuming vertical mounting) in order to ensure that any heat generated by the remaining electronics (or via incident radiation from external sources) results in optimal convective air flow, ie. drawn in from the external environment and upwards past the sensor. In the absence of forced air flow it is therefore important to mount the unit in the correct orientation and to ensure that the vents are not obstructed.

To ensure that the temperature measurement is as representative as possible the unit should not be mounted in an area where the surrounding air is likely to be locally affected by abnormal conditions. For example above a radiator, in the air flow of an air conditioning unit, adjacent to a window, in direct sunlight etc. For the typical application of room temperature measurement the unit can be mounted vertically on a suitable wall at shoulder height.

Note: It is more important to mount the unit in a location where the conditions are consistent rather than worry about the absolute value of the measured temperature. It is very unlikely that the temperature of the air in every location in a given room will be the same at any point of time, so the temperature measured by the sensor may not match the actual air temperature experienced by different occupants of the room. However for temperature regulation purposes it is mainly necessary that the temperature measured by the sensor varies in a manner that tracks the temperature at the occupants' location as closely as possible. Alternatively it is possible to use multiple sensors within a given room and then utilise averaging or other strategies to obtain the final temperature value. It is important to note that air temperature is by no means the only factor that affects perceived temperature. Indeed for a constant air temperature perceived comfort will also be dependent on other measurable and possibly controllable parameters such as incident radiation, humidity, and air velocity, but also on less easily controlled physio/psychological factors.

IDRATEK can supply temperature sensing modules in a weather proof housing upon request. These can be mounted in a preferably sheltered location exposed to the outside air (eg. under the eaves). Alternatively a standard module can be mounted on a surface mount backing box and this mounted within a typical alarm bell box. It is always important to choose a shaded area so that a true representation of the ambient air temperature is being measured. For example even if mounted in the eaves, direct sunshine on the wall beneath will create a layer of warm rising air which may skew the measurement significantly.

Finally it should be re-iterated that the distributed concept underlying the IDRANet system means that a multitude of sensors in different locations may provide a better solution than trying to find a 'perfect' location for just one sensor. Indeed multiple external/internal sensors can provide useful information for zoned heating systems, since for heating control (rather than informative) purposes it may be better to have a measure of temperatures at the individual wall surfaces rather than the ambient air…