NEXUS

MAKING YOUR LIFE EASIER AND YOUR BUILDING SAFER

Design & Installation Guide

Thomas&Betts

Leading the Way!!

NEXUS

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Thomas&Betts

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Introduction to NEXUS

This section presents an overview of the T&B NEXUS network. NEXUS is a computerised network communications system primarily designed to monitor, remotely activate and report on the status of NEXUS type single point emergency evacuation light SPUs in buildings .

Features

1. NEXUS is a labour-saving device that allows the testing of a building emergency lighting system from only one location.
   Previously, the testing of a building required many hours of labour for qualified staff to manually inspect and test every emergency SPUs and record it in a log book. Now, you can let the T&B NEXUS System do it for you.

2. NEXUS can test and report on the status of the entire emergency lighting in an installation individually, in groups or all together. NEXUS operates in real-time, indicating any change of status of network components by changing their icon colour in the NEXUS window.

3. The labour saving is achieved by using a T&B NEXUS System to communicate between the lights and the monitoring NEXUS Server. Custom designed NEXUS software allows the user to remotely activate the NEXUS SPUs and retrieve status information from them. Thus, maintenance personnel need only attend to the SPUs that need repairing/attention.

4. NEXUS is self-monitoring and, in the event of cable damage, can indicate the location of the fault down to the particular CHANNEL, which could save hours of manual fault finding.

5. The operation of the emergency lighting function is neither impeded by nor dependent upon NEXUS. NEXUS is simply used to monitor and remotely activate the SPUs without the need to actually sight each one for testing. Of course, any physical maintenance such as cleaning and re-lamping **must** still be done manually.

6. A NEXUS SPU can be removed or added anywhere on the NEXUS Network, without interruption to the operation of the remainder of the system.

7. Other forms of network topology are prone to interruption. Looped serial cables have the disadvantages of propagation delay factors that increase with the length of the loop and slow the communications. A break anywhere in the loop ceases communications within the loop.
   Star connections that require separate input and output cables are no more than a loop wired in a star pattern. Proper Star topology networks require sophisticated hub switching devices at the centre hub of every star. T&B chose to use the bus topology of a main line (backbone or TRUNK) with multiple side lines (ribs or branches) connected in an **unpolarized** daisy chain. The conductors are not polarized (+ & -), thereby making connecting very easy, requiring no metering polarity test equipment.

8. T&B also chose to use a single twisted pair cable as the network medium because extensive study showed that this was the most economical, reliable and easy to install. Other media considered were power-line, infrared, radio-frequency, fibre-optic and coaxial cable, however they have shown to be either uneconomical, unreliable, hard to install or a combination of all three.

9. A NEXUS-equipped building should never be at risk of inadequate emergency lighting. The completed NEXUS installation can be divided into Groups for testing purposes. By selectively alternating the grouping of the emergency light SPUs, the installation can be tested in stages so that not all of the emergency lighting of the building is in ‘recovery mode’ after a discharge test.

Introduction to Emergency Lighting

This section presents an overview of emergency lighting systems. It describes the function of emergency evacuation lighting, the different types of emergency lighting fixtures and their uses, the different types of emergency lighting systems, with their overall advantages and disadvantages.

Throughout this guide, the term emergency lighting is used generically and refers to both Exit and non-Exit type emergency lighting fixtures. Those that do have an Exit sign attached are commonly referred to as Exit lights, whereas those that have no Exit sign attached are commonly referred to as emergency lighting fixtures.

NOTE: *Emergency evacuation lighting is designed to automatically provide adequate lighting levels and signage for the safe evacuation of humans from buildings in the event of electricity supply failure to the normal lighting of the building.*

Emergency Lighting Fixture Single Point Unit (SPU) Types

No matter which type of SPU you use, they are all connected to an unswitched permanent connected 120V or 347V AC power supply.

AC Supply Connections and Emergency Lighting

Unswitched

NOTE: *All emergency lighting fixtures must be connected to an Unswitched supply.*

The unswitched supply is used to charge the battery and is monitored to determine the supply status. It therefore, must be present at all times to ensure reliable operation of the emergency function when required.

Switched

Some emergency lighting fixtures have two input connections, switched and unswitched.

The non-emergency part of those fixtures can be turned ON and OFF in the same manner as conventional light fixtures. **Switching off the supply to the emergency part of the light fixture is not permitted.**

Emergency Lighting System Types

There are two main types of emergency lighting systems that are described by the location of their emergency batteries:

- Central Systems, and
- Single Point Systems.

Central Systems

Description

Large, weighty banks of vented rechargeable batteries are wired together to create backup supplies for emergencies. These are often located in one room along with their charging equipment and hard-wired directly to all of the emergency lighting in the building. They generally operate at DC voltages of either 24, 50, 60, 110 or 120V. Central Systems are the older of the two system types. They were the only suitable batteries available until the manufacture of small NiCad and lead-acid sealed batteries (that are used in Single Point Systems) became economical and readily available in the 1970s.

Method of Operation

Their control is usually through hard-wired relays or contactors located within the system cabinet or the lighting distribution switchboards of the installation. When the power to the local lighting circuit fails the relay or contactor drops out and this in turn connects the low voltage emergency battery supply to the emergency lights, via the normally open contacts. Hence, when the normal lighting fails, the emergency lighting comes on.

Advantages

The advantages of a Central System are one location for the servicing of the equipment and maintenance of the system batteries. Typical central system batteries, if maintained regularly can perform adequately and last for a quarter of a century or more.

Disadvantages

The many disadvantages of a Central System are: its large initial cost involving the purchase of the battery bank; the large charger equipment; the flame/flash proof room space and ventilation equipment necessary, the batteries and charger location; the cost of installing the expensive large gauge distribution cabling and control equipment for the DC circuits; the inherent dangers of Direct Current shock; and the large ongoing maintenance costs.

Any changes to the layout of the floor plan that affects the location of the egress route in the event of an emergency, requires the rewiring and relocation of the emergency lighting fixtures and the expensive DC supply cabling. Any alteration to any part of the system requires the shutdown of all of that section of the system during the change.

The maintenance of the batteries themselves can be a hazardous job involving the risks of explosions, poisonous gases, acid burns and DC electric shock.

Central Systems cannot presently be connected to a computerized monitoring system and so require a manual test and visual inspection of every emergency light every month to comply with The National Fire Code of Canada (NFC 2005).

Single Point Systems

Description

Single Point Systems contain small sealed rechargeable batteries and charging equipment located within the light fixtures. Each fixture operates as a single stand-alone point known as a Single Point Unit (SPU) and therefore does not require the operation of external or centralized control equipment to function in an emergency.

Method of Operation

The batteries are charged by the normal electricity supply connected to the fixture.When the power to the local lighting circuit fails, the internal circuitry of the emergency lighting fixture connects the low voltage emergency battery supply to the emergency lamps. Hence, when the normal lighting fails, the emergency lighting comes on to illuminate the area.

Advantages

The advantages of Single Point Systems over Central Systems are that they are less expensive to purchase, to install and to maintain. They are more flexible in design in that any part of the installation can be removed or added to without affecting the remainder of the system. Because the fixtures are self-contained and can stand alone, there is no need for fireproofing the supply cabling to them.

None of the potentially hazardous Central System battery maintenance risks occur in Single Point Systems.

A more recent advantage is that Single Point Systems can now be centrally controlled via dedicated communications networks and monitored by a PC program to aid in the maintenance of the system. The computerized systems do not require manual inspection of the light fixtures every month as the computer can tell the service personnel exactly which fixtures require attention and where they are located. The computer can also contain and manage the logbook required under National Building Code of Canada.

Disadvantages

The disadvantage of Single Point Systems is that the smaller sealed cell rechargeable batteries have a shorter Service Life than Central System batteries and so require replacement more often.

Communications and Emergency Lighting

Computerized emergency lighting systems are a combination of a communication network system and emergency lighting distributed throughout a building. The network is used to communicate between the emergency lighting fixtures and a centrally located controller, usually a computer. The network can pass messages both to and from the emergency fixtures to either instruct the fixtures to do something (such as turn on or off their emergency lamps) or to report back to the controller giving their status (such as whether their lamps are working).

These computerized emergency lighting systems can and do use a variety of means to communicate. The most common, inexpensive and reliable method uses a dedicated communications cable wired between every emergency lighting fixtures and the controller. The method of communication within the network, called the protocol, determines the way the communication cabling must be installed, connected and used. Different brand emergency lighting systems, using different protocols, cannot be combined.

To have trouble-free operation of the communications system, the cable most suited to the type of installation must be used, and the recommended design and installation procedures must be followed in detail. It is not difficult, but does require attention to detail. The importance of correct cable selection and installation can not be understated.

Is this the right guide for you?

This guide is part of a series of user-friendly guides to help you design, install, commission, maintain and operate the T&B NEXUS System.

Choose the correct guide to suit your needs.

If you don't have the guide you need, ask for it from your T&B Representative.

Design & Installation Guide

NEXUS Design Section

The NEXUS Design Guide is for the person responsible for the design of the T&B NEXUS System in buildings, and includes:

- Technical information on NEXUS.
- NEXUS design requirements and specifications.
- A guide to selecting the correct communications cable.
- Step-by-step NEXUS design procedure.
- Sample consultant specifications.
- Sample 'typical' NEXUS designs.

NEXUS Installation Section

The NEXUS Installation Guide is for the person responsible for the installation of the T&B NEXUS System in buildings, and includes:

- NEXUS terminology.
- Pre-installation checklist and reminders.
- NEXUS equipment installation requirements and procedures.
- Communications cable selection and connection details.
- ROUTER/REPEATER installation procedure.
- Using the Channel Tester to test communications.
- Preparation for System Commissioning.

NEXUS Commissioning & End User Guide

This section is for the person responsible for testing and commissioning the installation and responsible for the operation and use of the T&B Nexus System, and includes:

- An introduction to the T&B NEXUS System.
- NEXUS software installation requirements and procedures.
- Commissioning the NEXUS Server, ROUTERS, REPEATERS, and SPUs.
- Testing NEXUS SPUs and communication.
- Report printing instructions.
- Fault finding and problem resolution.
- Service instruction generation and guidelines.
- Upkeep of system records.

NOTICE

These guides were prepared to assist the people responsible for a NEXUS system.

- *All information and recommendations are to the best of our knowledge, accurate at the time of writing.*
- *All specifications and tradenames registered or not, are the property of their respective owners.*
- *All specifications are subject to change without notice.*
- *Errors and omissions excepted.*

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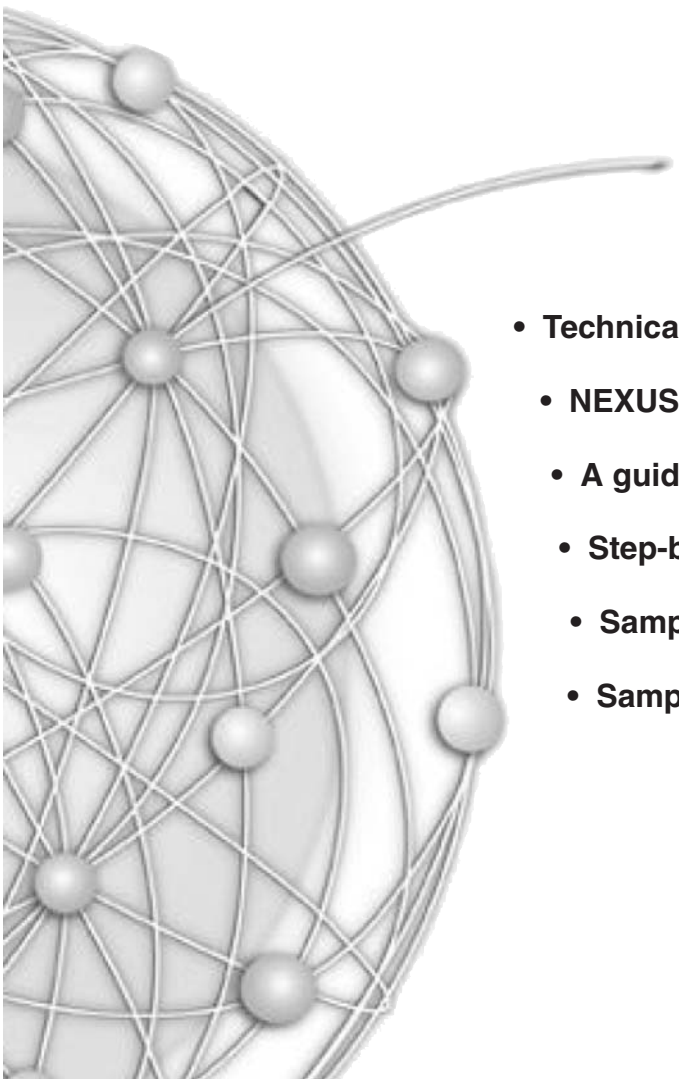
NEXUS
DESIGN SECTION

Everything you need to know
to fully plan and design a
T&B NEXUS
Network Control System for buildings



- **Technical information on NEXUS.**
- **NEXUS design requirements and specifications.**
- **A guide to selecting the correct communications cable.**
- **Step-by-step NEXUS design procedure.**
- **Sample consultant specifications.**
- **Sample “typical” NEXUS design.**

Designing NEXUS

Before You Begin

This guide will take you through the steps of designing a complete T&B NEXUS System. If you are experienced in this, then simply use this guide as a reminder. If however, you are not experienced in the proper methods of NEXUS design, T&B suggests that you read this complete guide through before you commence your design.

18 Steps to a Successful NEXUS Design

STEP 1

What You Will Need

This Design Guide:	Contains all of the design information, except that of National Building Code of Canada 2005.
Electrical knowledge:	You should know about electrical installations according to the N.B.C.
Drafting experience:	You should be experienced in creating, reading and interpreting plan drawings.
Floor plans:	Plans of the proposed installation for marking up.
Drawing equipment:	Facilities to mark up the plans either by hand or by computer.
Consultant's reference:	The owner's fit-out guide and consultant's specifications (if available and relevant).

STEP 2

Prepare Yourself

Collect all of the items listed in Step 1. Read the National Building Code of Canada and, using that information, determine exactly where in your project building you should locate the emergency light fixtures.

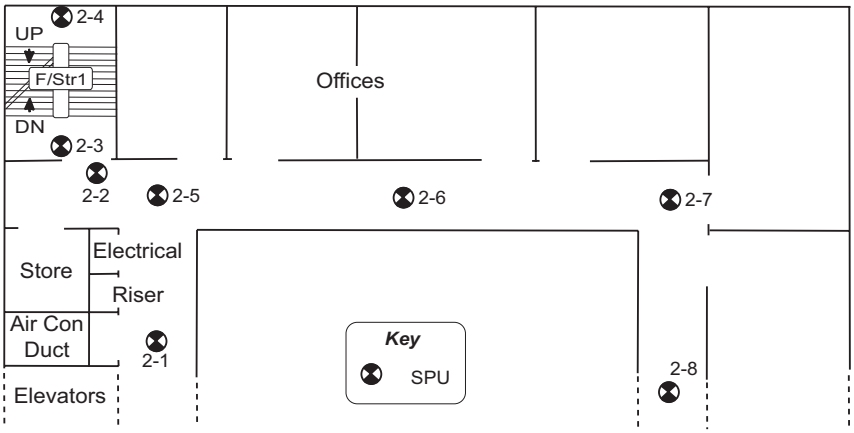
NOTE: *This NEXUS Design Guide does not attempt to tell you where you should locate the emergency lights and exit signs. You must refer to the recommendation of your T&B technical representative.*

STEP 3 Plan the SPU Locations

Locate the SPUs in a position that allows them to do their job, but also allows them to be easily installed and maintained. Any location that would require an extension ladder, scaffolding or a crane to gain access to the fixture is an unwise location for an emergency light. High-bay ceilings or directly over the steps of a stairway or over a well or opening are all locations that should not be chosen.

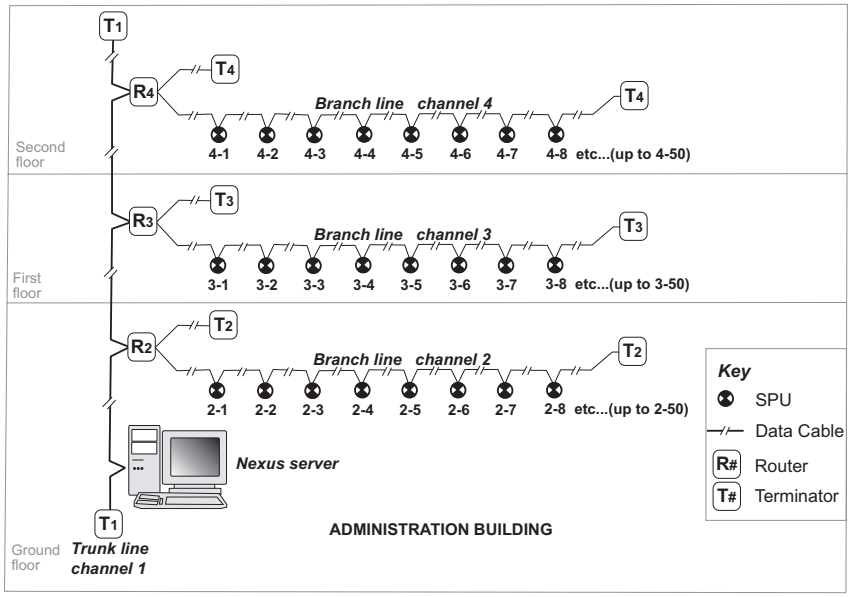
Usually, there are walls, pillars or landings that will provide a far more accessible position for access to the emergency lighting.

If the light fitting is too high, it will probably not provide enough light to comply with the N.B.C. Cost of installation will be less if the installing electrician can reach the lights easily. In addition, on-going maintenance costs will be minimized if the servicing electrician can reach the light (to change lamps, etc.).



Mark up the plans to indicate the exact location of every SPU. Cable routes are added at a later stage.

NOTE: *In the following examples, we have not differentiated between lighting fixtures and directional exits. Some designers use the letters EX and arrows in a box* EX *to symbolise a directional EXIT type fitting.*



STEP 4 Number the SPUs

During the Commissioning Stage of the project, NEXUS issues each SPU with a unique Channel Sequence Number from the database in the order they are wired/data cabled.

The Channel Sequence Number identifies each fitting as a function of its CHANNEL and its place on that CHANNEL. For example, the first fitting on CHANNEL 2 will have a Channel Sequence Number of 2-1.

Channel Sequence Numbers can be skipped and reserved for later use. Additional SPUs can be added to the system at any time. Any additional SPUs will be given the next available number from either the sequential order, or one from the reserved list.

During the design stage of the project, you should mark a unique Channel Sequence Number on the plan adjacent to the symbol for each SPU. **T&B suggests that you number in sequence along the CHANNEL routes.** Start with 1 and keep going until every SPU is numbered. If you know where extra SPUs will be added later, make allowance for them by reserving their sequential number positions now. Ensure that each Channel Sequence Number is unique, as NEXUS will not duplicate numbers.

STEP 5 Select the Most Suitable Cable

Select the Cable Type

DATA CABLES	Must be treated as communications cables and be physically protected from damage.
Communications cables	Must never be connected to AC supply.

Different DATA CABLE types have different characteristics which are better suited to carrying different frequencies.

The DATA CABLE types that are rated Universal Laboratories (UL) Level 4 (or better) have been designed, tested, proven and recommended for operating over the frequency range that NEXUS uses.

There are two main types of DATA CABLES that can be used for the NEXUS System: either Shielded or Unshielded. Both are Twisted Pair, UL rated Level 4 (or better) Communication.

Use only the same cable type within a CHANNEL.

Use only the DATA CABLE types that are listed here. Other DATA CABLE types will not work properly in this type of communications network and T&B (or their agents) will not commission improperly cabled projects.

The gauge of the wire directly affects the permissible maximum length of the CHANNEL. The sheathing of the cable directly affects where it can be run. Choose the appropriate cable for the situation in which it is to be used.

If multicore cables are used, the unused conductors must be individually connected and insulated continuously throughout the length of the CHANNEL. They are to be grounded at one point only at the ROUTER of that CHANNEL to prevent ground loops and possible communications interference. Only the conductors of the same pair must be used. Separate pairs must never be connected in parallel for any reason.

Unshielded cable

Unshielded cables are prone to picking up any extraneous electrical EMF-induced voltages and signals (noise) which may interfere with the proper data communications and therefore should only be installed where there is a low risk of noise interference.

Shielded cable

Shielded cables are less prone to picking up noise when installed and terminated properly.

Shielded cables **must** be run for the whole length of a CHANNEL if:

- Any part of that CHANNEL could potentially pick up any noise.
- The DATA CABLE is run parallel with AC supply cables.
- The DATA CABLE passes through or near a magnetic field such as an electric motor or a radio room.

Select the Cable Size and Brand

If the DATA CABLE is to be run in the same enclosure or conduit as AC supply cables, then the DATA CABLE insulation **must** be suitably rated, and the cable **must** be shielded.

Recommended DATA CABLE

DATA CABLE TYPE	UL/CSA RATING (type)	FLAME RESISTANT		BRAND (reference only)	MAX CHANNEL LENGTH
		CSA	Plenum		
Shielded Twisted Pair	CMG	FT4	CMP FT6	CERCO AT-HOM29	1,000 (3250ft)

STEP 6

Plan the Channel Routes

You can connect up to a maximum of 140 CHANNELS on a NEXUS system. T&B recommends that there be no more than 50 SPUs per Channel. Depending upon the physical layout of your particular project, arrange the SPUs in such a way that up to 50 are linked together to form a CHANNEL.

The maximum length of any CHANNEL is up to 300, 600 or 1000 metres, depending upon the type of data cable that you choose. See the previous section on cable selection for more details. In special situations where you cannot arrange less than 50 SPUs together, or the planned CHANNEL cable length will exceed the recommended maximum, you must add a REPEATER in the CHANNEL to boost the signals. This will allow you to lengthen the CHANNEL wiring to have up to 100 SPUs on that CHANNEL (see Step 8: Plan the Repeater Locations).

All wiring within fire stairwells **must** be fire-rated, so the less that is actually within the stairwell, the better. If you specify the mounting of the SPU on a wall in a fire stairwell where the other side of the wall is accessible, then non fire-rated wiring can be run through the wall directly into the back of the SPU. Using this method, no fire-rated wiring needs to be run within the stairwell at all. The most expensive alternative would be to specify that the wiring should run right up inside the length of the stairwell. That must be fire-rated and/or physically protected with steel conduit.

NOTE: *If you have not sequentially reference numbered the SPUs yet, do it as soon as you know the layout of the CHANNELS.*

STEP 7

Plan the Router Locations

Consider each CHANNEL connection to the TRUNK. Somewhere along the route of every CHANNEL, there **must** be a ROUTER connection to the TRUNK (to allow data flow to and from the TRUNK and thus the NEXUS Server). Consider the location of the ROUTER and remember that it must also be in a position that can be readily accessed for installation, commissioning and maintenance purposes.

Each ROUTER requires a 120VAC receptacle so ensure that you specify that it has a power point within reach (usually connected onto the same circuit that is servicing the SPUs in that area). T&B suggests that you locate ROUTERS in Electrical, Data or riser cabinets, at eye level, to allow for ready access.

STEP 8 Plan the Repeater Locations

In some circumstances, it may be necessary to double the length of a CHANNEL by adding a REPEATER to it. A REPEATER is just like a ROUTER, except that it does not connect to the TRUNK; rather it connects to the end of a CHANNEL to extend the length of that CHANNEL only. The extended segment takes on the identification of the CHANNEL it connects to so that both segments are regarded by NEXUS as having the same CHANNEL number. The REPEATER simply transfers all communication traffic from one segment of the CHANNEL to the other, effectively boosting and repeating the information for the benefit of the extended segment.

Each REPEATER requires its own 120VAC receptacle just like a ROUTER and should be located in a readily accessible and serviceable position as with a ROUTER.

The REPEATER is used to boost the data signal strength within the CHANNEL. It would be used in situations where you require between 50 and 100 SPUs on the same CHANNEL and there is no TRUNK cable within 100m (325ft) or so of this extended segment of the CHANNEL. A REPEATER could also be used in situations where the route length of the CHANNEL will exceed the recommended maximum length of the DATA CABLE type being used.

It may be more appropriate to select a different gauge wire cable type than to install a REPEATER that requires service access and its own power point. It also may be more appropriate to run a separate CHANNEL for the extended segment rather than using a REPEATER.

STEP 9 Plan the Terminator Locations

Remember that both ends of every CHANNEL must also have a CHANNEL TERMINATOR connected to them and that you must specify the location of both ends of every CHANNEL. Do not confuse an electronic CHANNEL TERMINATOR with the usual electrical connecting terminator or connector. They are not the same and cannot be interchanged. CHANNEL TERMINATORS are passive electronic devices that do not require a power source and do not usually require servicing. However, the location of every TERMINATOR should be specified and recorded so that it can be accessed in the future if need be, such as to extend the CHANNEL.

You should specify the exact location of each TERMINATOR keeping in mind the practicalities of access as discussed before. Often the CHANNEL will commence at the ROUTER location and a TERMINATOR will have to be located there. TERMINATORS are small enough to fit within the housing of a ROUTER or an SPU.

STEP 10 Mark the Channels, Routers, Repeaters, Terminators on the Plans

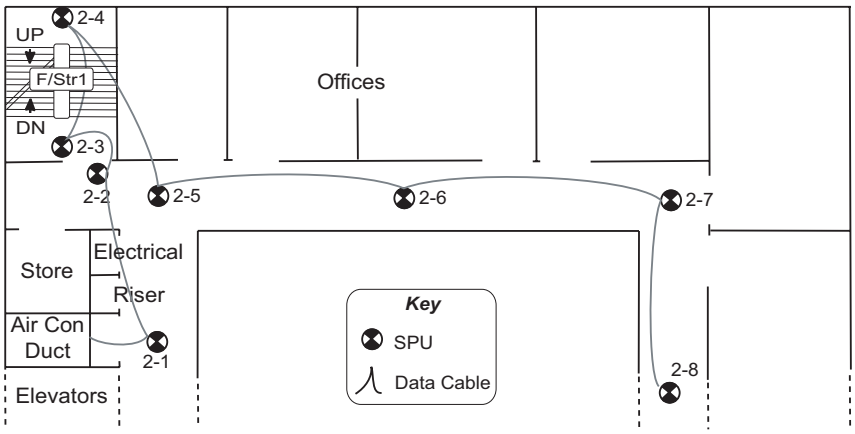
Once you have planned the CHANNEL routes, ROUTER, REPEATER and CHANNEL TERMINATOR locations, mark them up on the plans in the following manner.

Channel Data Cable Routes

The CHANNEL DATA CABLE route is represented on the plans as a line running from SPU to SPU within the CHANNEL. Each CHANNEL will require a separate line to represent it. The line should be easily distinguishable from any other lines on the drawing and no two CHANNEL lines should cross over each other.

You have the choice at this stage of either detailing the exact route of the cable, (you may have cable tray schematics), or you can specify an approximate route and leave the exact detail up to the installer. The exact cable route will need to be defined by the installer as part of "As installed drawings".

An easy-to-see method is used to chart the approximate cable route. This method is represented as curved lines on the drawings and can be made quite easily identifiable (see below).



Whichever method you choose, make it obvious and make it clear.

Routers

Where a CHANNEL meets the TRUNK, it must be connected through a ROUTER. Represent a ROUTER by drawing a box with a capital R on it in the drawing. Leave space after the letter for the inclusion of a CHANNEL identification number, to be added later when you number the CHANNELS. If you have the facilities, make the ROUTER symbol a different colour or add a label so that there is no confusion regarding its identity or location.

It should look something like this: R# and will eventually be numbered like this: R2.

NOTE: *There is no R1 on the TRUNK. Its function is performed by the NEXUS Server. Your ROUTER numbering should start at 2 and will match the numbering of the CHANNELS, i.e. R2 is connected to and serves CHANNEL 2, and so on.*

Repeaters

There may be circumstances where there is no alternative, so you must specify a REPEATER. Represent a REPEATER by drawing a box with Rpt on it in the drawing.

It should look something like this: Rpt .

Channel Terminators

Both ends of every CHANNEL must be connected to CHANNEL TERMINATORS. Represent a TERMINATOR by drawing a box with a capital T on it in the drawing. Leave space after the letter for the inclusion of a CHANNEL identification number, to be added later when you number the CHANNELS. If you have the facilities, make the TERMINATOR symbol a different colour ou add a label so that there is no confusion regarding its identity or location.

It should look something like this: T# and will eventually be numbered like this: T2.

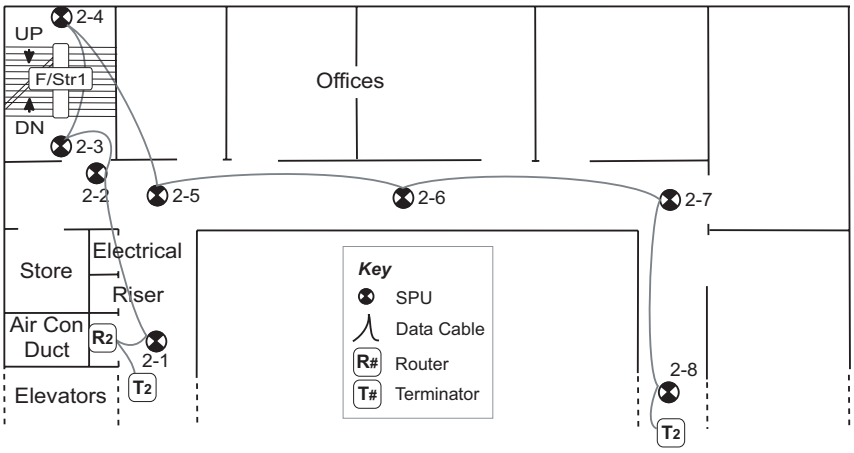
There will be two TERMINATORS with the same number on every CHANNEL, one at each end. Just like the numbering of the ROUTERS, you number the TERMINATORS to match the numbering of the CHANNEL they are connected to, i.e. T2 is connected to CHANNEL 2, and so on. The TRUNK is CHANNEL 1 so it uses the T1s.

Check your Work

By this stage, your drawing should be similar to the one shown below, showing:

- Up to 50 SPU symbols per CHANNEL,
- Sequential Channel Sequence Numbers,
- CHANNEL DATA CABLE routes,
- 2 TERMINATORS per CHANNEL, and
- 1 ROUTER per CHANNEL.

NOTE: *Check your drawings to make sure you haven't missed any of these items.*



NOTE: *The TERMINATOR symbols are too large to fit in the cabinet next to the ROUTER or in the SPU symbol, so we have drawn them in the passage way next to their CHANNEL ends. In this case, you would add a note to the drawing to specify that the TERMINATORS are to be located within the piece of equipment that is closest to the respective ends of the CHANNEL, i.e. within the ROUTER and Channel Sequence Number 2-8.*

It is good practice to make these items very visible on the drawings so that they are not forgotten by the installer.

You should also have an installation list with at least the first four columns filled in and a row for every SPU.

Remember that this list works in conjunction with your plan drawings to form part of the project specifications, and will eventually be the start of the installation database.

The Channel Sequence Numbering should make this crosschecking procedure relatively simple.

STEP 11

Plan the NEXUS Server Location

The NEXUS Server (PC) should be conveniently located for the NEXUS end user, usually in the Building Manager's or Maintenance Manager's office. Do not specify the location of the NEXUS Server in an area that is hostile to electronic equipment (such as in dusty, dirty, oily or humid areas, workshops, machine shops, switch rooms, furnace, plant rooms, or near high traffic areas such as passageways and corridors). The NEXUS Server will require two twin 120V receptacles, a desk with enough space for the one dedicated phone line, computer and monitor, the printer and paper feeder and to spread out copies of the plans.

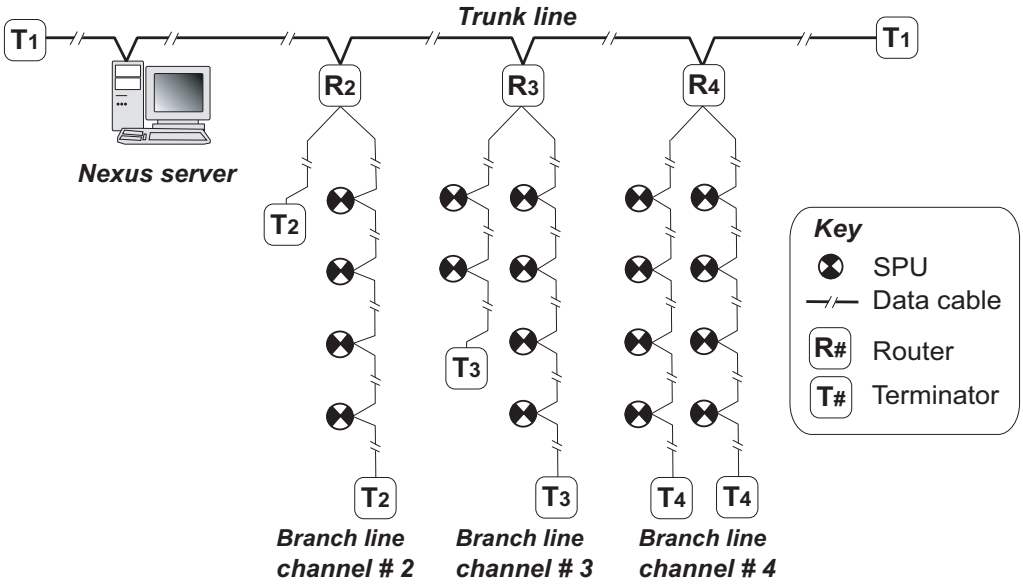
STEP 12

Mark the NEXUS Server Location on the Plans

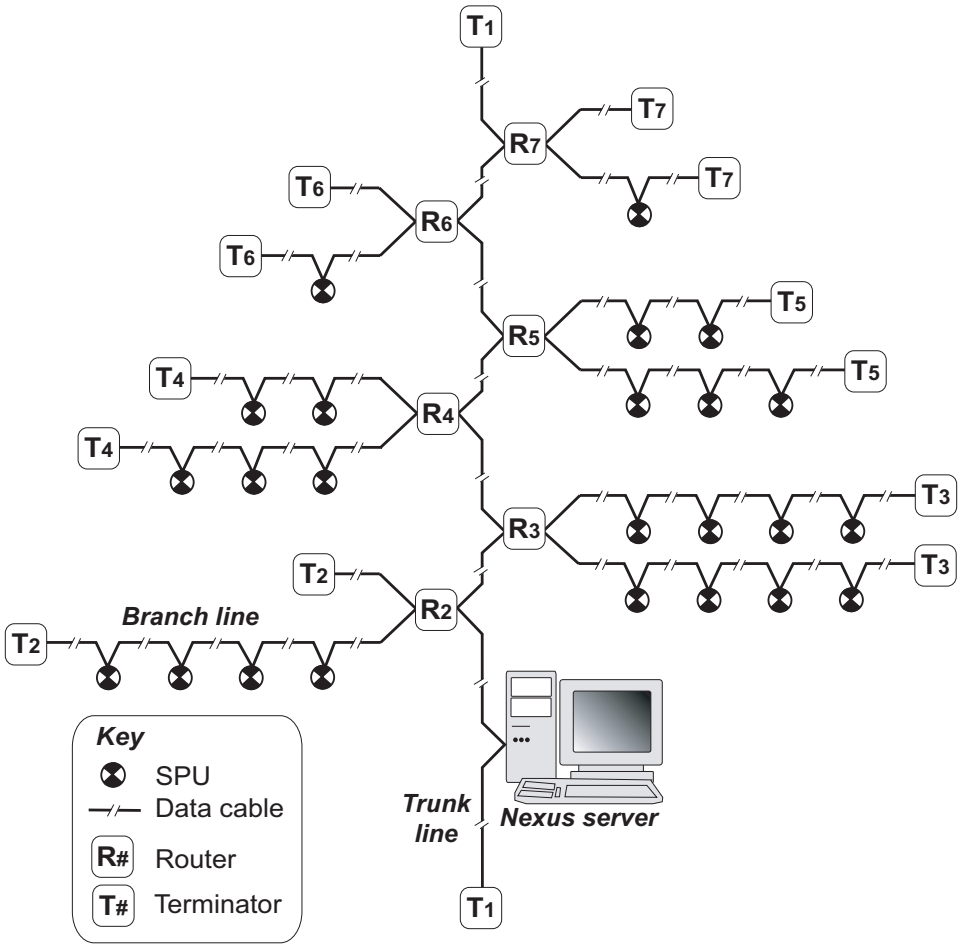
Mark the position of the NEXUS Server on the plans using a picture representation of a computer:

STEP 13 Plan the Trunk Route

Channel 1 is the TRUNK that makes the communications connection between the NEXUS Server and every other CHANNEL of the installation. All data that flows within the network passes through the TRUNK and the design of its route is most important for the efficient operation of the network. As stated, the NEXUS uses the multidrop or tree topology consisting of a TRUNK and branches as shown below.



This can resemble a tree, if you can imagine it on its side with hanging branches on both sides of the TRUNK as shown on page 14. Because the TRUNK is the most used section of data cable in the network, and because it links all the CHANNELS to the monitoring computer, the integrity of the TRUNK is of utmost importance. Any physical damage to the TRUNK cabling will cause the network communications to cease past the break, effectively isolating that portion of the installation and stopping communications with all of the equipment attached to the isolated portion.



For example, a break occurring in the TRUNK cable between R2 and R3 would effectively isolate CHANNELS 3 and up. The NEXUS Server would only be able to communicate with CHANNEL 2. The break would need to be located and repaired before communications to the isolated portion could resume.

Therefore, when planning the route of the TRUNK (and any other cable), **consider exactly where the cable is to run and how it is to be installed to prevent damage at any time**. Do not route data cabling on top of removable ceiling tiles where the movement of the tile (during other building or maintenance works) can damage it. Likewise, do not plan the route of the TRUNK through tenancy areas. If that tenancy is changed at some time in the future, work could damage the TRUNK.

T&B recommends that the TRUNK cabling be run only in the common areas of buildings and installed in such a way that accidental damage to the cabling be minimized. Most modern buildings have dedicated communications cable trays, cabinets or risers for running the cables.

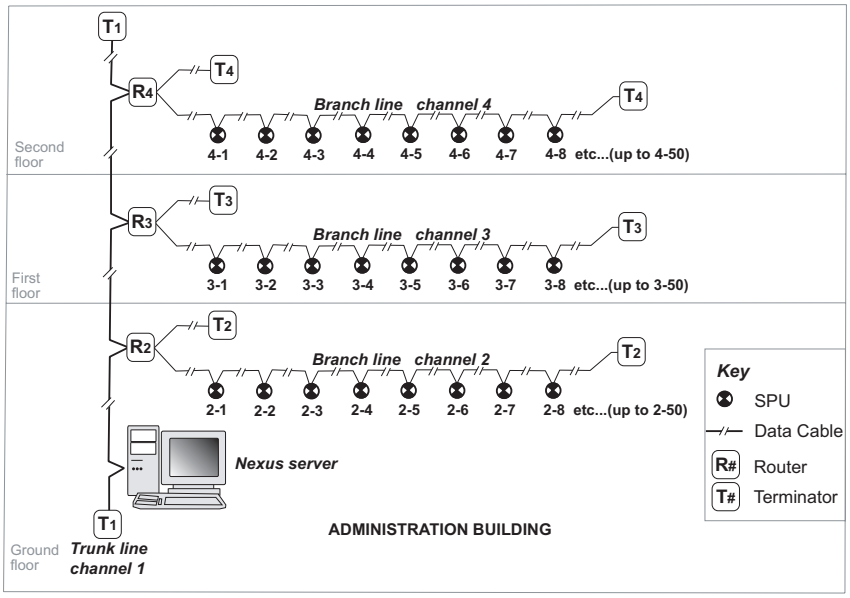
STEP 14

Mark the Trunk Route on the Plans

Draw the route of the TRUNK on your plans to link the NEXUS Server to every ROUTER in the same manner and style as you chose to represent the CHANNEL DATA CABLE wiring. Remember to include CHANNEL TERMINATORS at both ends of the TRUNK. They will be T1s.

STEP 15 Number the Channels

Using this knowledge of the NEXUS topology, we constructed the diagram below as the layout of the sample building we used earlier in the guide.



In this example, the TRUNK originates at the NEXUS Server located in the Building Manager's office on the Ground Floor and runs through the Data Riser to allow a Router connection on and for each floor. Here we have allocated a separate CHANNEL for each floor of the building. **The TRUNK must be CHANNEL 1**. In this example, the CHANNELS are numbered sequentially from the NEXUS Server outwards. The first branch CHANNEL nearest to the NEXUS Server called CHANNEL 2 serves the Ground Floor, CHANNEL 3 is for the Second Floor and so on. SPUs 2-1 to 2-50 are allocated to CHANNEL 2 on the Ground Floor, SPUs 3-1 to 3-50 are allocated to CHANNEL 3 on the Second Floor, and so on.

T&B recommends that you allocate only 50 SPUs per CHANNEL for reasons stated earlier, and to make installation, commissioning and maintenance easier.

Number the CHANNELS on your plans in sequential order from one end of the TRUNK to the other.

In fact, it is the logical choice as the TRUNK must be numbered CHANNEL 1, then the closest CHANNEL to the end that branches off the TRUNK should be numbered 2, the next 3, and so on.

During the commissioning of the installation, the ROUTERS and SPUs will be programmed with their own CHANNEL-coded ID numbers that tell them which CHANNEL they are connected to and which cannot be changed without a recommissioning process.

If, in the future, an extra CHANNEL is added to the TRUNK (at a point somewhere between the CHANNELS you have already sequentially numbered) the new CHANNEL must be given a different number than any existing CHANNEL. So, in the future, the connected order may become out of numerical sequence. No two CHANNEL numbers can be the same. The system will communicate with the CHANNELS by their ID number, not their sequence. This feature of NEXUS allows for future alterations to the installation without the need for major renumbering and recommissioning.

If you know about future possible additions to the system, you can make allowances for that now by reserving the proposed additional CHANNEL number. Skip to the next so that the eventual outcome will be a connection order that matches the numerical sequence order of your plans.

Once you have numbered the CHANNELS, write the CHANNEL number in the space provided for previously in the ROUTER and TERMINATOR symbol boxes on the plans.

They should look something like these: R2 R3 R4 and T1 T2 .

NOTE: *There is no R1. Its job is done by the NEXUS Server, which is located where R1 would otherwise be.*

Remember that there is one Router and two Terminators per CHANNEL, i.e. CHANNEL 2 will have R2, T2 and T2 connected to it; CHANNEL 3 will have R3, T3 and T3 and so on.

STEP 16

Create the Materials List

1. Cross reference the Installation list with the plan drawings to double check the data and totalize the SPU type Catalogue number column to create a materials list of SPUs.
2. Count the number of CHANNELS and calculate the quantity of:
   - CHANNEL TERMINATORS (2 per CHANNEL).
   - ROUTERS (1 per CHANNEL).
   - REPEATERS (1 per extended CHANNEL).
3. Include 1 PC package (as listed in NEXUS Technical Specifications) per NEXUS network.
4. Include the NEXUS software and adaptor card.

List all these items together in a specification materials list that would allow the potential installer to quote for the supply of the equipment during the tendering stage of the project.

STEP 17

Create the Project Specifications

This is the end of the Design Stage. You should have completed the plan drawings showing the:

- Location of the SPUs.
- Individual Channel Sequence Number of every SPU.
- CHANNEL routes.
- ROUTER, REPEATER and TERMINATOR locations.
- TRUNK route.
- NEXUS Server location.
- Distribution Board and Circuit Breaker details.
- GROUP number of the SPUs if desired.

Also, specify the receptacles for the NEXUS Server and equipment, ROUTERS and REPEATERS. You will also need to include the NEXUS Server and peripherals including furniture, if required.

- A sample emergency lighting specification is appended to this guide.
- Sample typical project designs are appended to this guide.

You can copy and include them in your tender documents.

Designer checklist:

1. Maximum of 50 SPUs per Channel/Router.
2. Sequential numbering of SPUs (i.e. use of channel sequence numbers).
3. Maximum of 140 Channels.
4. Sequential numbering of Channels/Routers.
5. Obey Data Cable length restrictions for each Channel depending on the Data Cable type used (refer to Select the Cable Size and Brand).
6. End-of-line Terminators must be at the beginning and end of each cable segment and shown on the drawings.
7. Data Cable should be shown on drawings wherever possible.
8. Ensure NEXUS Server location is accessible and practical for both the Installer and End User.

You have now reached the end of the design stage. If you require any further assistance, call the T&B Product Support Help Hotline.

STEP 18

Contractor (Installer) Requirements

This step specifies what the Designer needs the Installer to do.

1. Use sequential numbering of Routers as per the Trunk cable route.
2. Use sequential numbering of SPUs as per the Channel cable route (i.e. channel sequence number).
3. Enter all Router and SPU location and description information into the NEXUS Server database.
4. Provide complete as-installed drawings detailing Data Cable routes, Router locations, SPU locations and all Router and SPU numbering.
5. Follow installation and commissioning procedures as described in NEXUS Installation Guide and NEXUS Commissioning Guide.

Sample Consultant Specification

Emergency Lighting Fixtures

The Fixtures shall be manufactured and installed in compliance with CSA141 C22.2. Each fixture shall contain 3 x 8 bit microprocessors with two processors responsible for data communications to ensure fast reliable data transfer rates.

The micro-controller in each emergency light fitting shall monitor and store the operation of:

- AC supply (on/off)
- Battery connection (charging/not charging)
- Battery charger (on/off)
- DC-AC inverter output (on/off)
- Emergency lamp light (on/off)

Each fitting shall store the result of its last discharge test in non-volatile memory that is retained even after loss of both AC power and DC battery supply.

The system shall not require factory pre-programming of fixtures and the server on site shall issue them with a Network address identification number during commissioning of the communication system.

Computer Hardware

Pentium III processor based PC (or better) with Windows 2000 Professional or XP Professional, with at least 256 MB RAM, 20 GB 7200 rpm HDD, CD-RW Drive, 1.4 MB FDD, 15" (or better) SVGA Monitor, 56 kpbs Modem (or better), mouse and pad, one free internal PCI BUS slot, plus Inkjet/
Bubble Jet printer (or better) and paper. The network functionality and testing facilities are dependent upon a PC being present.

Computer Software

The software shall:

- Be fully compatible with Windows 2000 or later.
- The system interface shall be a 32 bit graphical application capable of representing the network topology on the screen.
- Allow addition, deletion or replacement fixtures without interfering with the rest of the network and without the need to reprogram any other fixtures.
- Allow the end user to create and delete test groups and allow any fixtures to be moved to a test group using standard Windows functions (Drag and Drop or Cut and Paste).
- Include a Maintenance Group that contains all faulty SPUs within the System.
- Contain a Maintenance logbook recording all discharge tests and system maintenance.
- Provide facility for location information to be entered into a database detailing all relevant information for the Server, Routers and SPUs.

Communications

The communications system protocol shall be Echelon LonTalk™. Network communications shall be via a multidrop bus topology using a single twisted pair, shielded data cable rated UL Level 4 (or better) connected in an open-ended daisy-chain manner.

The network speed must be at least 78 kbps to ensure a fast and reliable network, capable of further expansion. A complete status poll shall take no longer than one (1) second per fixture.

The Network shall be divided into segments (Channels) containing not more than 50 emergency light fixtures. Each Channel shall be not more than 1000 m (3250 ft) in data cable length.

Each Channel shall be terminated with a Channel Terminator at each end and the location of the Channel Terminators shall be within the last device nearest to each end of the Channel. Each channel shall be segmented from the system backbone (Trunk) by the use of a router device.

The Channel data cable must not have any “tee-offs”. It shall be one continuous segment that does not require looping back to its other end. The Channel data cable shall connect to each emergency lighting fixture and the Router in a daisy-chain manner.

A backbone/trunk cable system shall connect all the routers in a daisy-chain manner back to a front-end controller/server.

System Programming/Commissioning

The installing electrician shall carry out commissioning of fixtures onto the Network Communication System. Installation of the system shall be a four-stage process:

Stage 1 Design, specification and tendering.

Stage 2 Installation, wiring and data cabling testing.

Stage 3 Set up server and software, program fixtures onto the network, creating database, practical completion.

Stage 4 End user operation training.

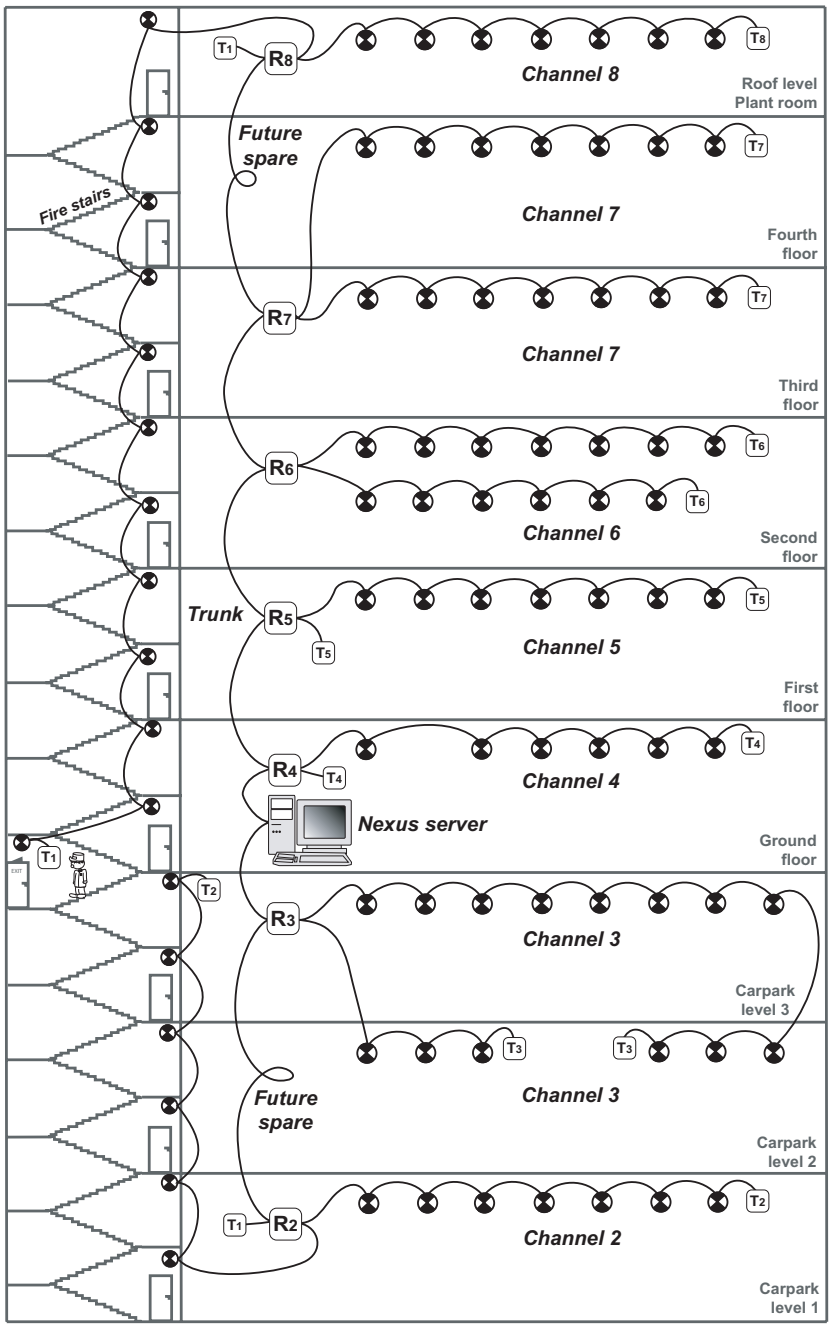
At the time of commissioning, all routers and emergency lighting fixtures are to be clearly labelled with the network address assigned by the server.

All descriptive information required by the front-end software package is to be entered by the commissioning contractor and saved in the system database for the system server, routers and emergency lighting fixtures.

Detailed "As Installed" drawings must be provided upon completion of the system installation providing the following information:

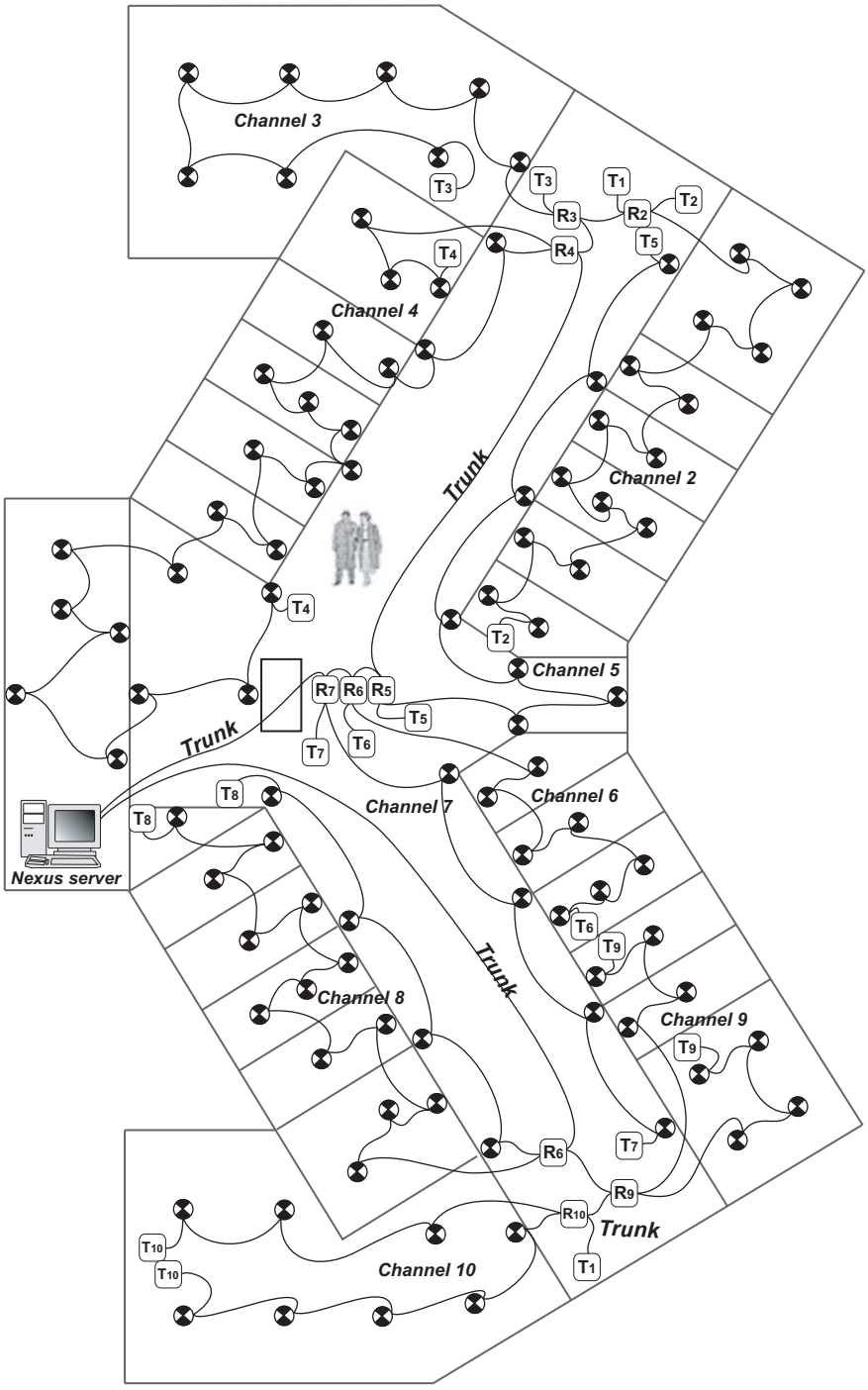
- Location of the system server, routers and emergency lighting fixtures.
- Data cable installation routes and exact graphic detail of the data cable installation between the routers and the server and the emergency lighting fixtures and the routers.
- All routers and emergency lighting fixtures must be labelled with the network address assigned by the system sever and must match the label attached to the router or emergency lighting fixture.

Sample Typical High-rise Layout



Here are some examples of the many different ways that Channels can be routed through a high-rise building. Keep in mind that each Channel **must** use the same brand and type of cable throughout its length. Every Channel **must** have a Terminator at both ends. The total number of SPUs can not exceed 50 per Channel.

Sample Typical Shopping Centre Layout

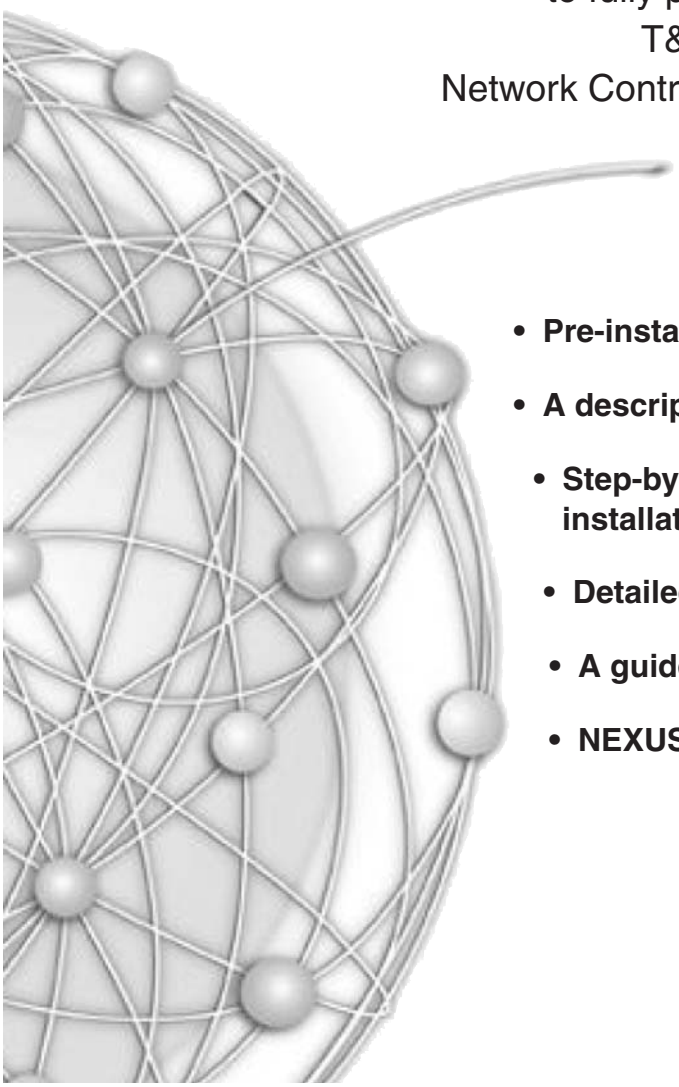


Here are some examples of the many different ways that Channels can be routed through a Shopping Centre. Keep in mind that each Channel must use the same brand and type of cable throughout its length. Every Channel must have a Terminator at both ends. The total number of SPUs can not exceed 50 per Channel.

Thomas&Betts

NEXUS INSTALLATION SECTION

Everything you need to know
to fully plan and Install a
T&B NEXUS
Network Control System for buildings



- **Pre-installation checklist and reminders.**
- **A description of NEXUS symbols.**
- **Step-by-step instructions for communication cable selection, installation and testing.**
- **Detailed NEXUS installation requirements and procedures.**
- **A guide to selecting the correct communications cable.**
- **NEXUS commissioning preparation procedure.**

Communications and Emergency Lighting

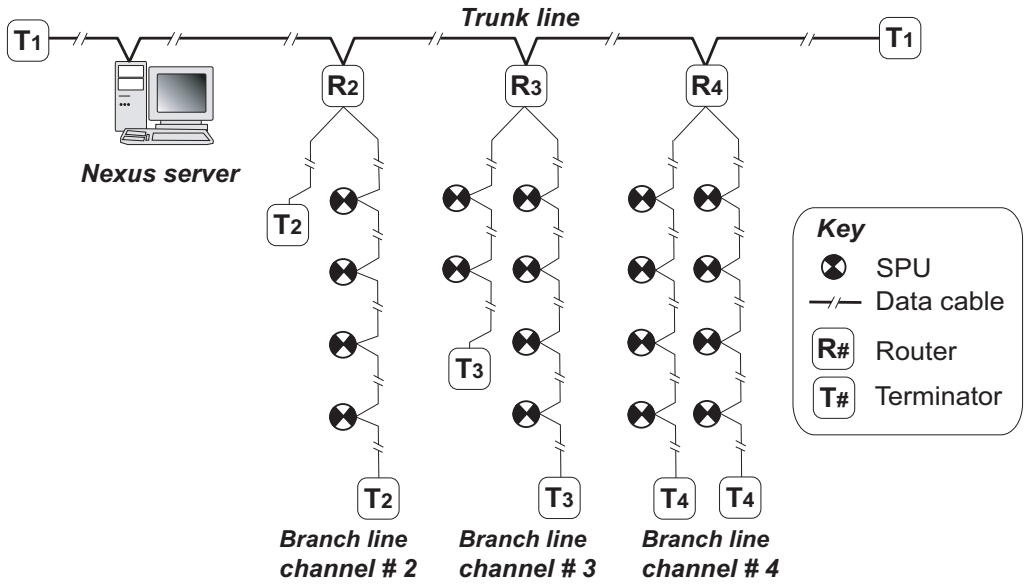
Computerized emergency lighting systems are a combination of a communications network system and emergency lights distributed throughout a building. The network is used to communicate between the emergency light fixtures and a centrally located controller, usually a computer. The network passes messages both to and from the emergency fixtures. This may be to instruct the SPUs to do something (such as turn on or off their emergency lamps) or for the SPUs to report their status to the controller (such as whether their lamps are working).

These computerised emergency lighting systems can and do use a variety of means to communicate. The most common, inexpensive and reliable method uses a dedicated communications cable wired between every SPU and the controller. The method of communication within the network, called the protocol, determines the way the communications cabling must be installed, connected and used.

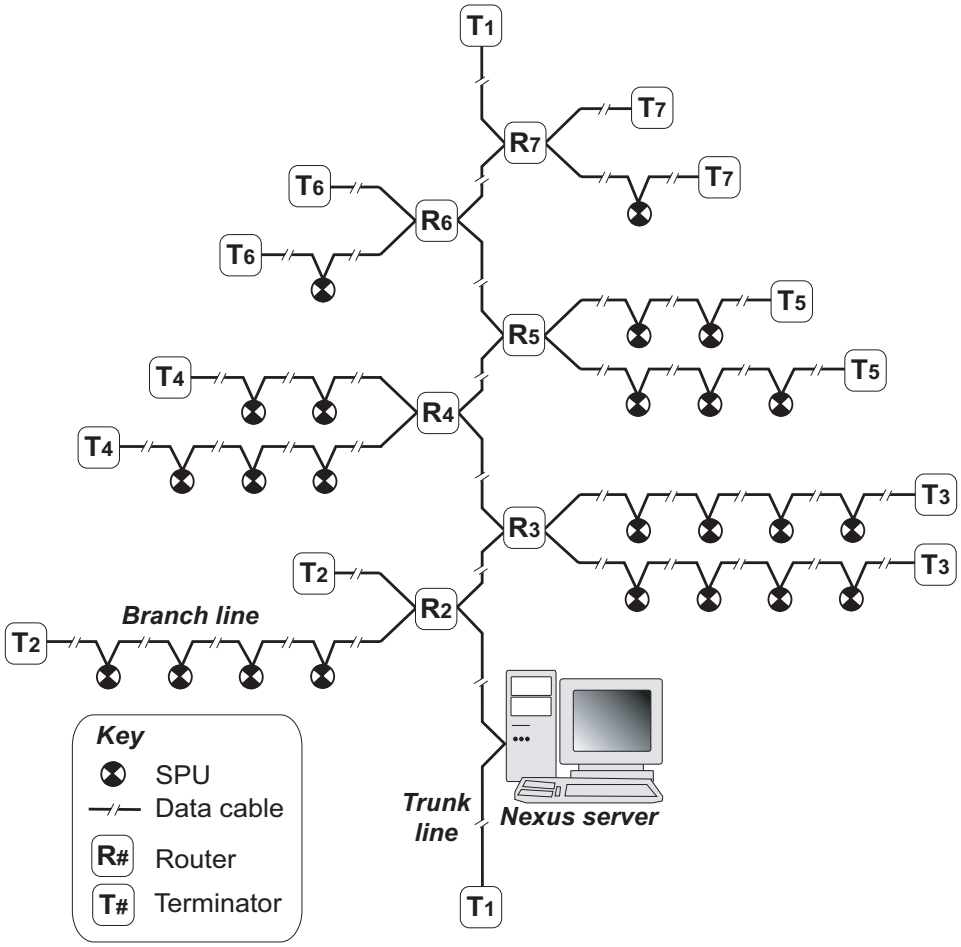
Other manufacturers of emergency lighting systems use differing Communication Networks and/or protocols. A T&B Nexus System therefore **CAN NOT** be combined with other “Brand” fixtures.

NEXUS Topology

NEXUS uses a multidrop bus topology consisting of a common main line (TRUNK) with side lines (branches) hanging off it which looks something like that shown below.



This can look something like a tree if you turn it on its side and hang branches off both sides of the TRUNK, as shown below.



Before You Begin

To install a T&B NEXUS System it is assumed that you have the designed plans and project specifications of the proposed installation with you. You may have been given design specifications that state which cable type you must use, or that detail may be left up to you, the installer. If the design of the installation has been left up to you, then you should use the separate NEXUS DESIGN SECTION to design the installation before you continue.

This guide will take you through the steps of installing a complete T&B NEXUS System. If you are experienced with installing a NEXUS project, then simply use this guide as a reminder. If however, you are not experienced in the proper methods of NEXUS installation, T&B suggests that you read this complete guide through before you start the installation.

What You Will Need

This Installation Section:	Contains all of the installation procedure information.
Electrical knowledge:	You should know about electrical installations and National Electrical Code 2005.
Drafting experience:	You should be experienced in reading and interpreting plan drawings.
Project plans:	Marked-up floor plans of the layout of the proposed installation.
Installation db list:	Installation database information listings.
Materials list:	Detailing the quantities of materials required.
Project specifications:	Design details and specifications of the project.
Drawing equipment:	Facilities to mark up installed plans either by hand or by computer.
Consultant's reference:	The tenant's fit-out guide and consultant's specifications (if available and relevant).

The NEXUS System

NEXUS System Specification

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The Fixtures shall be manufactured and installed in compliance with CSA141 C22.2. Each fixture shall contain 3 x 8 bit microprocessors with two processors responsible for data communications to ensure fast reliable data transfer rates.

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- All routers and emergency lighting fixtures must be labelled with the network address assigned by the system sever and must match the label attached to the router or emergency lighting fixture.

NEXUS System Components

The physical components that make up the NEXUS System are described in the following topics.

Single Point Units (SPUs)

The term for an emergency lighting fixture (unit) that stands alone and includes its own rechargeable battery and charger equipment. When normal AC power fails, it turns on its emergency lamp until the power is restored or the battery discharges.

The selection and placement of the SPUs is usually determined by the relevant building codes and STANDARDS. The design plans should show their exact location and type.

Emergency fixtures/SPU are represented by the emergency lighting symbol  while directional exits may be shown as  or  .

Single Point Unit (SPU) Types

- **Non-Maintained:** use one or more lamps that do not normally light the surrounding area but are used only for emergency lighting. The light output is on only when the power fails.

Switching Emergency Lighting

- **Unswitched Active:** all SPUs must be connected to an Unswitched Active supply. The unswitched supply is used to charge the battery and is monitored to determine the supply status.

Channels

A CHANNEL is a section of Level 4 (or better) data communications cable used as the physical transport medium for data packets. Its length is limited to 1,000m (3,250ft), it is terminated at both ends with signal TERMINATORS and it has a maximum of 60 NODES. T&B recommends only 50 SPUs per CHANNEL to allow for future expansion.

If you cannot arrange less than 50 SPUs together, or the CHANNEL cable length will exceed the recommended maximum, you must use a REPEATER in the CHANNEL to boost the signals. This allows you to lengthen the CHANNEL wiring to have up to 100 SPUs on that CHANNEL. There can be only one REPEATER per CHANNEL.

You can connect up to a maximum of 140 CHANNELS on NEXUS. Depending upon the type of CABLE used; the maximum length of any CHANNEL is up to 300, 600 or 1000 metres. See Select the Cable Size and Brand for more details.

The CHANNELS on your plans should be numbered in sequential order from one end of the TRUNK to the other. The TRUNK must be numbered CHANNEL 1, then the closest CHANNEL to one end branching off the TRUNK is numbered 2, the next 3, and so on.

Channel Sequence Numbers

The Channel Sequence Number identifies each SPU as a function of its CHANNEL and its place on that CHANNEL. For example, the first SPU on CHANNEL 2 will have a Channel Sequence Number of 2-1.

Channel Sequence Numbers can be skipped and reserved for later use. Additional SPU's can be added to the system at any time. Any additional SPU's will be given the next available number from either the sequential order, or one from the reserved list.

Trunk

CHANNEL 1 is the TRUNK, which provides the communications connection between the NEXUS Server and every other CHANNEL, in a daisy-chain method. As network data passes through the TRUNK, its installation is critical.

Any physical damage to the cabling will cause the network communications to cease past the break. Consider where the cable will run and how it will be installed, to prevent damage.

T&B recommends that the TRUNK cabling be run in secure cabling areas within a building so that accidental damage to the cabling is minimized. Most buildings now have dedicated communications cable trays, cupboards and risers.

Routers

A ROUTER connects a CHANNEL to the TRUNK and selectively transfers data PACKETS, while boosting the signal strength.

The ROUTER must be located where it can be readily accessed. As it requires a 120V 60Hz receptacle connection, make sure that it is close to a power point (usually on the same circuit as service the local SPU's). T&B recommends that you locate ROUTERS in electrical, data or riser cabinets, at eye level, to allow for ready access. ROUTERS are represented in the drawing by a box with a capital R and a CHANNEL identification number in it, for example R2 R3 R4.

NOTE: *There is no R1 on the TRUNK. Its function is performed by the NEXUS Server (PC). Your ROUTER numbering should start at two and will match the CHANNEL numbering, i.e. R2 is connected to and serves CHANNEL 2, and so on.*

Repeaters

A REPEATER connects two sections of a CHANNEL together to extend the length of the CHANNEL where you require a cable run longer than that allowed, or must install between 50 and 100 SPUs. It transfers all communications traffic from one segment of the CHANNEL to the other, amplifying and repeating the information for the extended segment.

A REPEATER is like a ROUTER, except that it connects to the end of a CHANNEL to extend the length of that CHANNEL. Both segments of the CHANNEL are regarded by NEXUS as having the same CHANNEL number.

Each REPEATER requires its own 120V receptacle. The REPEATER should also be located in a readily accessible and serviceable position.

A REPEATER is represented in the drawing by a box with Rpt in it, for example Rpt.

Channel Terminators

A TERMINATOR is a small packaged Resistive/Capacitive (RC) printed circuit board that must be attached to both ends of every CHANNEL including the TRUNK.

TERMINATORS are passive electronic devices that do not require a power source and do not usually require servicing. However, their locations should be specified and recorded.

TERMINATORS are represented in the drawing by a box with a capital T and a CHANNEL identification number in it, for example T2 T4.

There will be two TERMINATORS with the same number on every CHANNEL, one at each end. The TRUNK is CHANNEL 1 so it uses T1. T2 is connected to CHANNEL 2, and so on.

NEXUS Server (Personal Computer)

The NEXUS Server should be located close to the end user of a NEXUS System, usually in the office of the Building Manager or Maintenance Manager. Do not locate it in an area that is hostile to electronic equipment such as dusty, dirty, oily or humid areas, workshops, switch rooms, plant rooms, or near high traffic areas.

This can be shown on the drawing like this.

The NEXUS Server will require 2 twin 120V receptacles, a desk with enough space for the computer and monitor, the printer and paper feeder and to spread out copies of the plans.

Data Cable Types

- DATA CABLES must be treated as communications cables and be physically protected from damage.
- Communications cables must never be connected to the AC supply.
- Different DATA CABLE types have different characteristics which are better suited to carrying different frequencies.
- The DATA CABLE types that are rated Underwriter Laboratories (UL) Level 4 (or better) have been designed, tested, proven and recommended for operating over the frequency range that NEXUS uses.
- Two main types of DATA CABLES can be used for the NEXUS System : either Shielded or Unshielded. Both are Twisted Pair, UL rated Level 4 (or better) communication cables.
- Use only the same cable type within a CHANNEL.
- Use only the DATA CABLE types that are listed here. Other DATA CABLE types will not work properly in this type of communications network and T&B (or their agents) will not commission improperly cabled projects.
- The gauge of the wire directly affects the permissible maximum length of the CHANNEL. The sheathing of the cable directly affects where it can be run. Choose the appropriate cable for the situation in which it is to be used.
- If multicore cables are used, the unused conductors must be individually connected and insulated continuously throughout the length of the CHANNEL. They are to be grounded at one point only, at the ROUTER of that CHANNEL, to prevent earth loops and possible communications interference. The conductors of the same pair must be used. Separate pairs must never be connected in parallel for any reason.
- All cables and wiring methods should conform with the revelant article of the National Electrical Code.

Unshielded cable

Unshielded cables are prone to picking up any extraneous electrical EMF-induced voltages and signals (noise) which may interfere with proper data communications and therefore should **only** be installed where there is a low risk of noise interference.

Shielded cable

Shielded cables are less prone to picking up noise **when installed and terminated properly**.

Shielded cables **must** be run for the whole length of a CHANNEL if:

- Any part of that CHANNEL could potentially pick up any noise.
- The DATA CABLE is run parallel with AC supply cables.
- The DATA CABLE passes through or near a magnetic field such as an electric motor or a radio room.

Select the Cable Size and Brand

If the DATA CABLE is to be run in the same enclosure or conduit as AC supply cables, then the DATA CABLE insulation must be suitably rated, and the cable must be shielded.

Recommended DATA CABLE

DATA CABLE TYPE	UL/CSA RATING (type)	FLAME RESISTANT		BRAND (reference only)	MAX CHANNEL LENGTH
		CSA	Plenum		
Shielded Twisted Pair	CMG	FT4	CMP FT6	CERCO AT-HOM29	1,000 (3250ft)

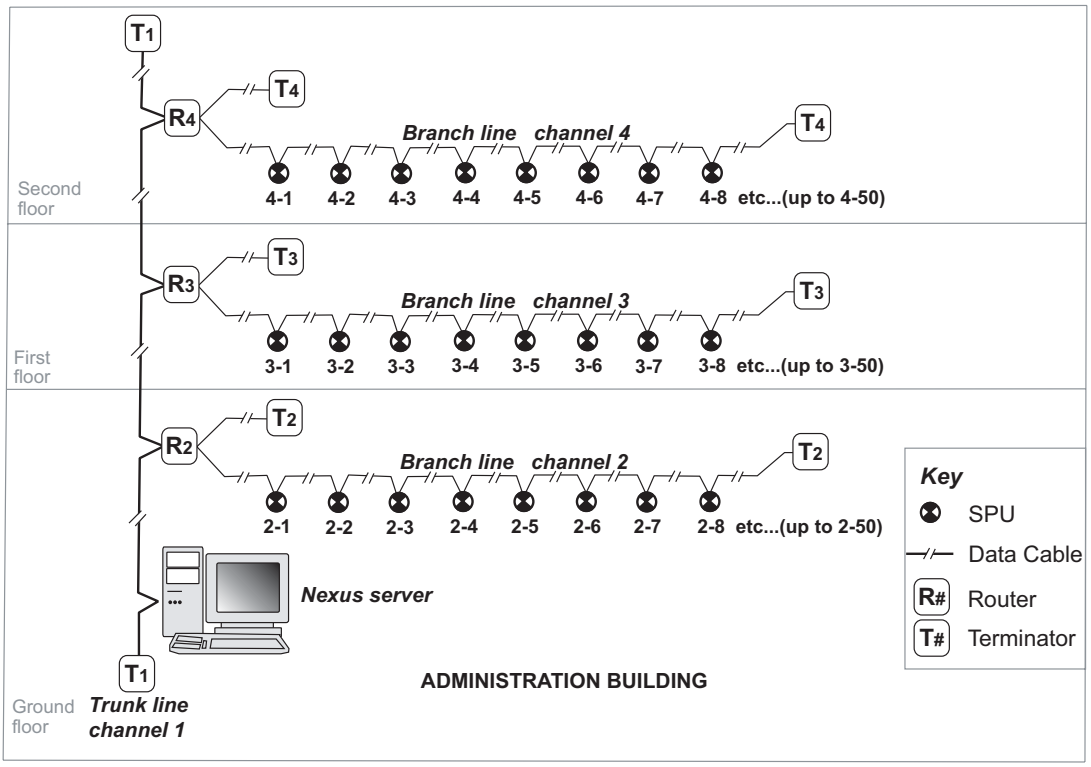
Contact your nearest T&B office for the latest recommended type.

Sample Diagrams

Using this knowledge of NEXUS topology, the diagram below was constructed as a sample building profile line diagram.

In this example, the TRUNK originates at the NEXUS server located in the Building Manager's office on the Ground Floor and runs through the Data Riser to allow a ROUTER connection on, and for, each floor. Here a separate CHANNEL has been allocated for each floor of the building. The TRUNK must be CHANNEL 1. In this example, the CHANNELS are numbered sequentially from the NEXUS Server outwards. The first branch CHANNEL nearest to the NEXUS Server called CHANNEL 2 serves the Ground Floor, CHANNEL 3 is for the First Floor and so on. SPUs 2-1 to 2-50 are allocated to CHANNEL 2 on the Ground Floor, SPUs 3-1 to 3-50 are allocated to CHANNEL 3 on the Second Floor, and so on.

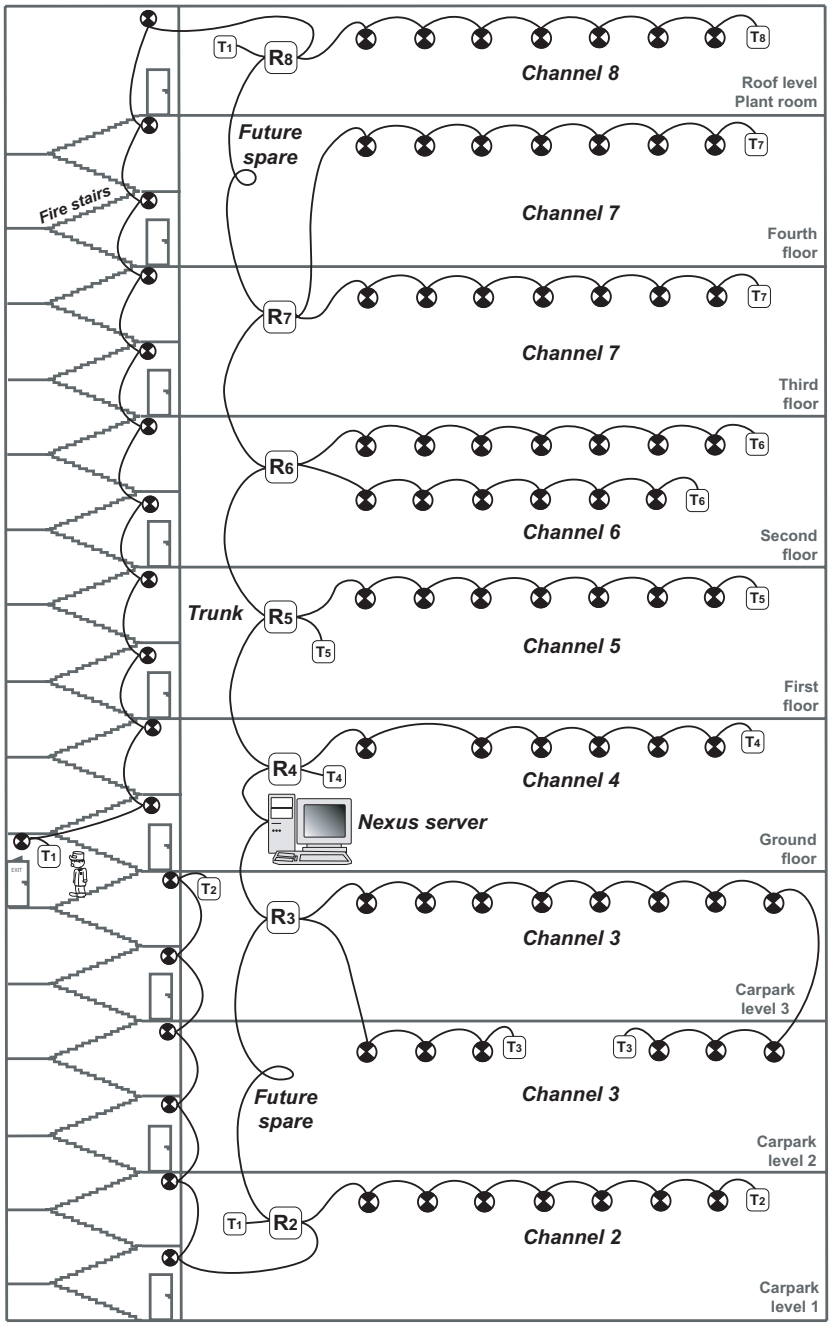
***NOTE** the use of Channel Sequence Numbers for the SPUs.*



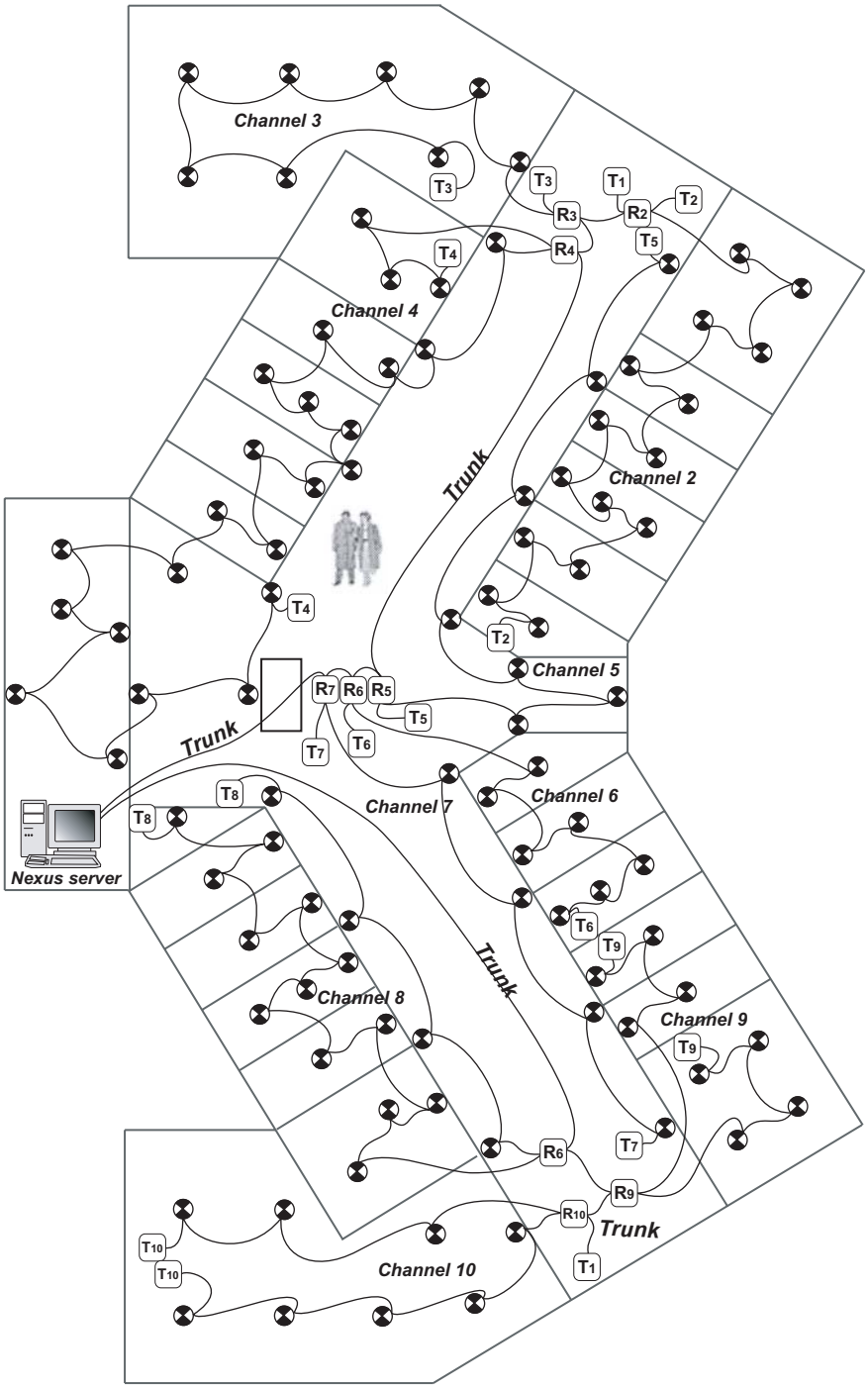
***NOTE** that there is no R1. The NEXUS server is located where R1 would otherwise be.*

Remember that each CHANNEL has a ROUTER and two TERMINATORS (i.e. CHANNEL 2 will have R2, T2 and T2 connected; CHANNEL 3 will have R3, T3 and T3 and so on).

Sample Typical High-rise Layout



Sample Typical Shopping Centre Layout



Before you Install

Check the Plans and Specs

The plans should contain:

- Up to 50 SPU symbols per CHANNEL.
- Sequential Channel Sequence Numbers.
- Clear CHANNEL DATA CABLE routes.
- 2 TERMINATORS per CHANNEL.
- 1 ROUTER per CHANNEL.
- Clear TRUNK DATA CABLE route.
- 1 NEXUS server (PC) location.

You should also have an installation list with at least the first 7 columns filled in and a row for every SPU. This list works in conjunction with the plan drawings and will be the start of the installation database. SPU reference numbering aids this crosschecking procedure.

The installation list should contain:

- The SPU reference number.
- Plan name or number.
- Plan grid cross-referencing data.
- A location description of the SPUs, including the building name or number if there are more than one.
- The floor or level numbers if there are more than one.
- The area or zone if it has a name or a compass bearing if it does not.
- The SPU Catalogue number or fitting type.
- The electrical isolation details of the lighting circuit that the SPUs are to be connected to.

See the sample installation database list below:

CH SEQ #	LOCATION DESCRIPTION			DRAWING		SPU type/ Catalogue #	DB #	CB #	Ch #	Grp #
	Bldg	Level	Area/Zone	Plan #	Grid #					
2-1	Admin	Gnd	West corridor near elevators	ABC123	C4	SFNXS10FP	2	12	2	2
2-2	Admin	Gnd	NW corner at Firestair 1	ABC123	B3	MQFNXS110M	2	12	2	2
2-3	Admin	Gnd	Inside Firestair 1	ABC123	B3	BTNXS218M	1	5	2	1
2-4	Admin	Gnd	Landing, Firestair 1	ABC123	B2	BTNXS218M	1	5	2	1
2-5	Admin	Gnd	NW corridor near Firestair 1	ABC123	C3	SFNXS10FP	1	12	2	2
2-6	Admin	Gnd	Centre of North corridor	ABC123	E3	SFNXS10FP	2	12	2	2
2-7	Admin	Gnd	NE corner of North and East corridors	ABC123	G3	etc…				

Legend: **DB** distribution box **CB** circuit breaker **Ch** channel **Grp** group

A blank database information sheet is appended to this guide. Photocopy sheets as required.

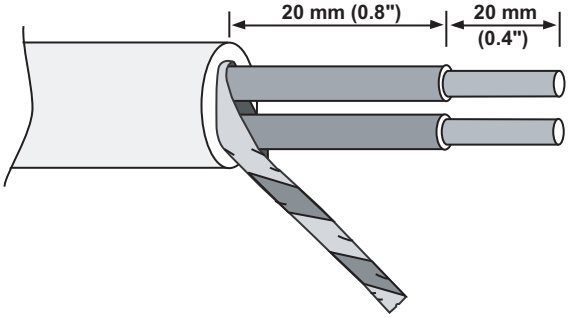
Installing the Cabling

Following are details of how to prepare and install the different types of cable that may be used in a NEXUS System installation.

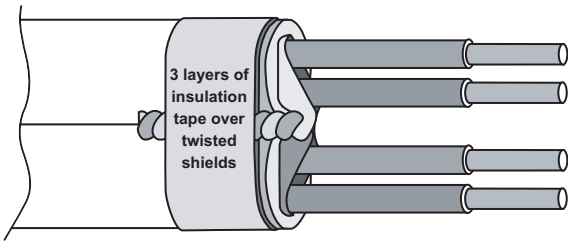
- When shielded cable is used, the shielding must be connected and terminated correctly.
- Using a shielded cable without correctly terminating the shielding will result in reduced perfomance of the communications network. It creates unwanted harmonics within the DATA CABLE, which can interfere with proper network communications.
- T&B (or their agents) will not commission incorrectly wired installations.
- The shielding must remain electrically continuous across the cable joins, yet electrically isolated from the conductors and any other metalwork or potential grounding point throughout the length of the DATA CABLE, except for the one point where it must be connected to ground at the ROUTER. The TRUNK cable shielding must only be connected to ground at one point, nominally at ROUTER 2.

T&B recommends that shielded DATA CABLES be stripped and terminated in the following manner.

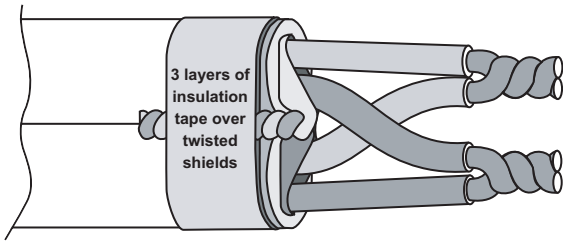
1. Strip back and remove the outer sheathing of the cable for approximately 30mm (1.2”) from the end of the cable being careful not to nick, cut or damage any shielding or conductor insulation under the sheathing.
2. The shielding must then be peeled back to the level of the outer sheathing and unravelled to allow it to hang away from the cable to expose the inner insulated conductors. Then twist the shielding together to form a third conductor for the cable which allows it to be connected to the shielding of the other cable for continuous electrical conductivity of the shields.



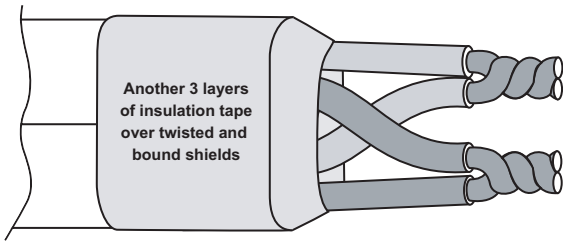
3. Pull the twisted shields backaway from the data conductors, being careful not to damage them, and lay them parallel with the sheathing back down the cable away from the ends. Use electrical insulation tape to wrap around the cables and the shielding as shown below to hold it in place. Make sure the tape wraps completely around the cables and itself for a full 3 turns as less than 3 turns will unravel itself over time. Cut off any excess shielding hanging out past the end of the tape.



4. Strip back and remove conductor insulation approximately 10mm (0.4”) from the end of the cable to allow for termination. Then twist them into like coloured pairs.



5. Wrap all of the exposed shielding with at least 3 layers of tape to provide adequate electrical insulation and mechanical protection, as this is the final outer layer.



Terminating Data Cable

The brand and type of cable you are using will determine the colour of the insulation of the conductors. Twist like colours together; i.e. black to black,or red to red and so on. If present, twist the shields together.

Terminate the data wires into their respective terminals as provided in the SPUs. There are only 2 data wires and 2 data terminals. The data terminals are unpolarized, so it does not matter which wire pair goes into which terminal.

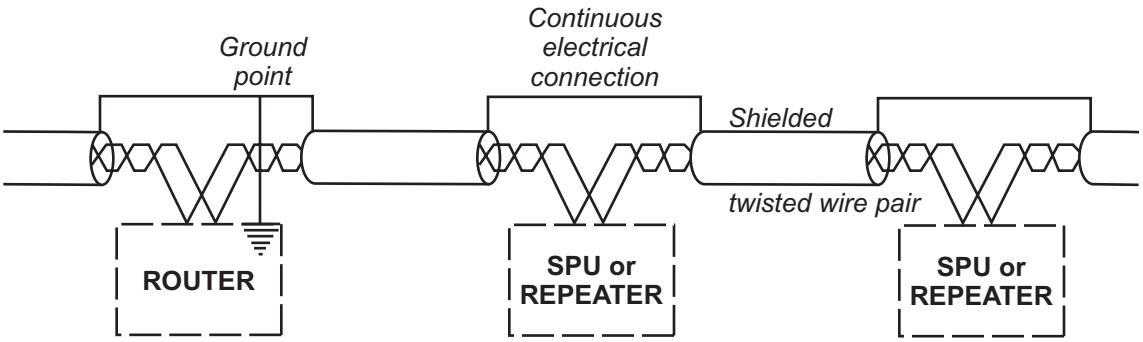
It is most important to ensure that the individual conductors of the same cable do not come into electrical contact with each other, with the shielding or with any metalwork.

If multicore cables are used:

- The unused conductors are to be individually connected and insulated continuously throughout the CHANNEL.
- They are to be grounded at one point only at the ROUTER of that CHANNEL, to prevent ground loops and possible communications interference.
- The conductors of the same pair must only be used.
- Separate pairs must never be connected in parallel for any reason.

Grounding Shielded Cables

Shielded cable can introduce problems if the shielding itself is not properly terminated. The shielding must be electrically continuous throughout the length of the CHANNEL and connected to ground at only one point in the CHANNEL, at the ROUTER. If the CHANNEL contains a REPEATER, then the shielding must be electrically continuous and bypass the REPEATER the same as the shielding connections at a SPU. The shielding must not connect to ground at any point other than at the ROUTER, nominally ROUTER 2 (see below).



Data Cabling Rules

- The NEXUS network DATA CABLE is connected to the data terminals of each SPU, in an unpolarised parallel daisy-chain method.
- Every SPU should have only 2 DATA CABLES connected to it.
- The only NEXUS device that has one cable connected to it is the last unit on a CHANNEL, at which point a CHANNEL TERMINATOR must be installed.
- ROUTERS and REPEATERS can have 2 to 4 cables connected to them, depending upon the configuration of the installation and on whether a CHANNEL TERMINATOR is located there.

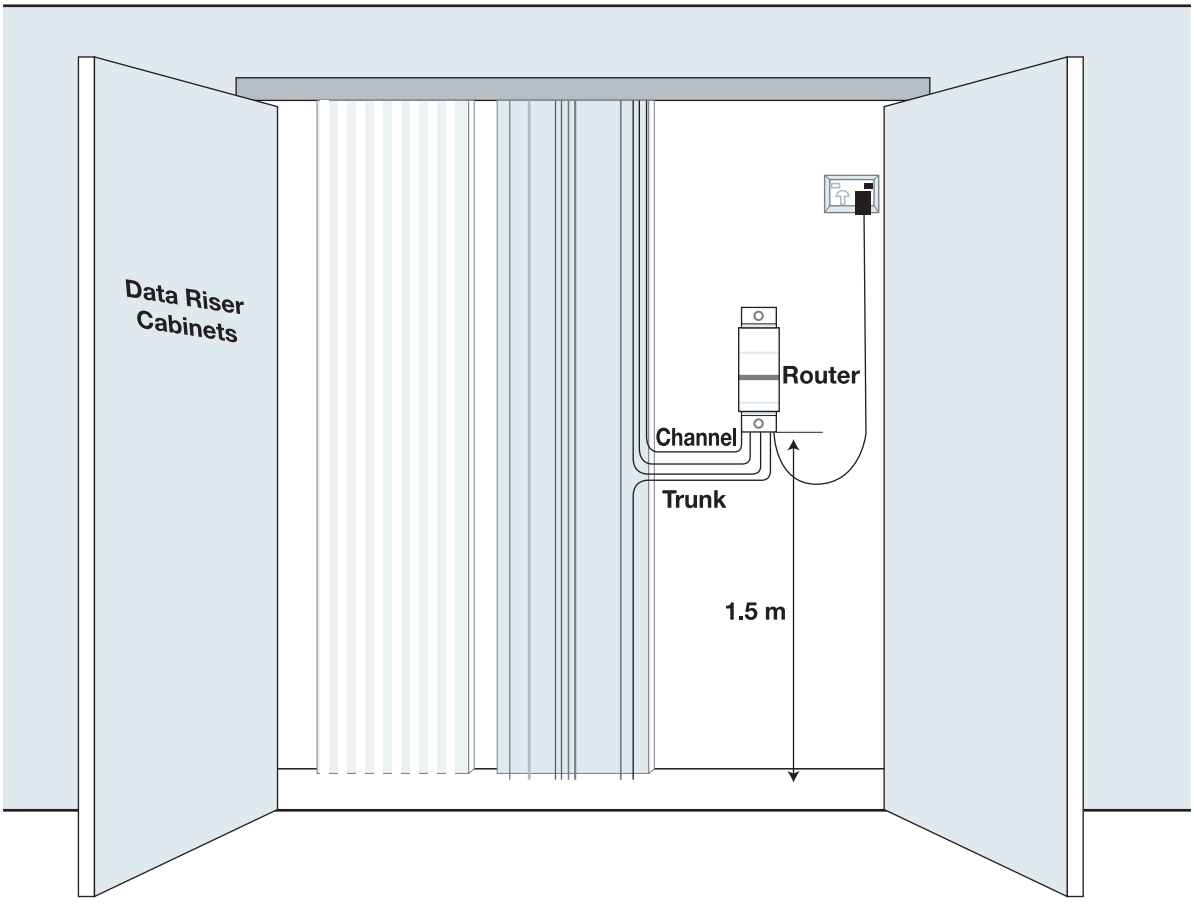
Installing Routers (or Repeaters)

ROUTERS and REPEATERS should be located to allow for easy access for commissioning and future maintenance. They should be installed in either electrical or data cabinets, mounted about arm-height (about 1.5m (5ft) above floor level), so they can be readily seen and accessed. Each ROUTER (or REPEATER) requires its own AC receptacle, usually on the same circuit as the local emergency lighting (so that it is not inadvertently turned off).

Each ROUTER requires two sets of DATA CABLES. One set is the local CHANNEL and the other set is the TRUNK. In choosing the location of the ROUTER (or REPEATER) make allowance for the routing and connections of these cables.

In a typical installation within a multi-storey building in which the TRUNK runs up a communications riser and tees off at each floor, the ROUTER would be located adjacent to the riser cable tray, as shown below.

NOTE *the cable access routes, the height of the ROUTER and the power point.*



The TRUNK cables are to be clearly marked, and kept separate from the CHANNEL cables. The TRUNK cables connect to the terminals labelled TRUNK. The CHANNEL cables connect to the terminals labelled CHANNEL. Do not confuse them. If you are not sure which cables are which, trace them back to their origin or use an Ohmmeter to identify them. DO NOT USE a HI-Pot tester. Label the cables appropriately and connect them to the Router.

A REPEATER must be installed in the same manner as a ROUTER. It requires its own AC receptacle, as for a ROUTER.

NEXUS Router

On the underside of the unit, there are two data ports and two power sockets (see the right part of the figure below). On the front of the unit, there are two terminator switches, two data test sockets, four LEDs and a push button (see the middle part of the figure below). The unit is supplied with a plug pack power supply, two data cable connector plugs, a DC power jumper lead and an external data cable terminator. The label on the front of the unit is made of a material that can be written on. During commissioning of the network, record the channel numbers on this label for later reference.

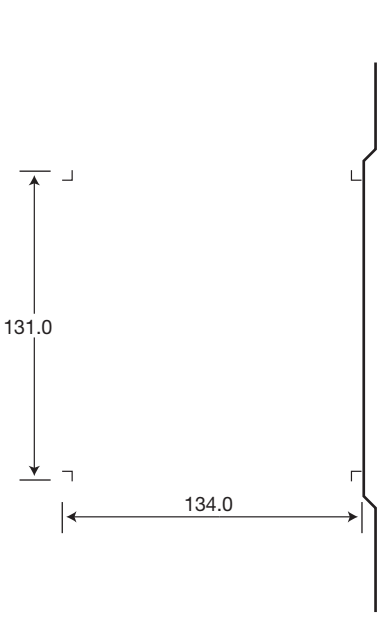


Figure 1

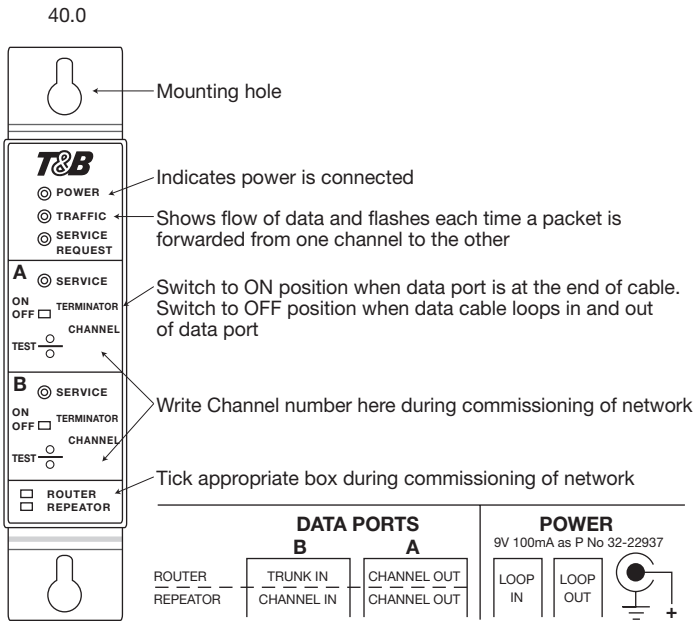
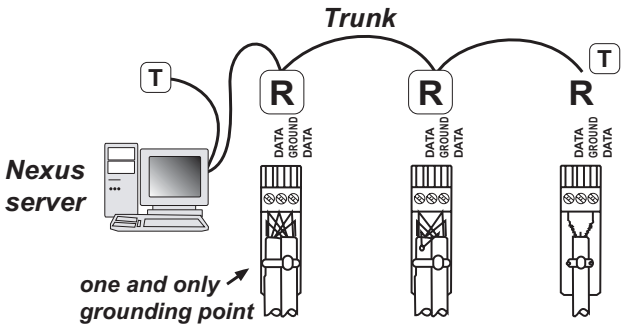


Figure 2

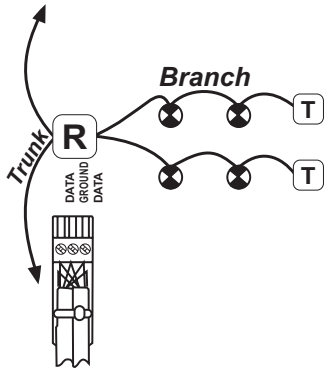
Figure 3

Regardless of whether you are connecting ROUTERS or nodes to the twisted-pair data cable, all are wired in parallel across the pair. The connection is polarity insensitive. The data connection to the router is made using a 3-way connector plug for each data port. The centre pin in each corresponding socket is the ground, the outer 2 pins are data. The four different types of connections that can be made with this connector plug are shown on the next page.

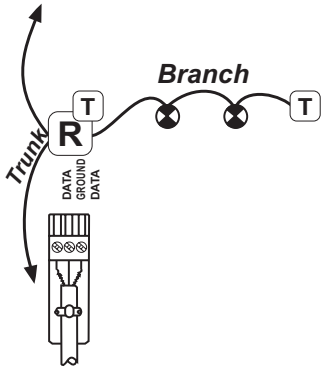
Example Router Connections:



Terminator	OFF	OFF	ON
Shield	TWISTED GROUNDED	TWISTED NOT GROUNDED	NOT GROUNDED
Data Cable	LOOPED	TWISTED	END



Terminator	OFF
Shield	TWISTED GROUNDED
Data Cable	LOOPED



Terminator	ON
Shield	GROUNDED
Data Cable	LOOPED

The function of the cable shield is to reduce pick-up of electrostatic noise. If the shield is not correctly installed, the shield can pick up more noise than if the shield was not there at all. The shield must be electrically continuous throughout the length of the CHANNEL and be connected to ground at one point only, at a ROUTER or REPEATER. Connection at more than one point will create a ground loop in the shield, which can pick up noise.

Terminators

Every correctly wired channel or channel section can be viewed as a continuous length of data cable with nodes distributed along its length. The two ends of every CHANNEL must each have a Terminator connected to it.

ROUTERS have a terminator built into each data port that can be switched on or off as appropriate. Often, a channel starts or finishes at a ROUTER or REPEATER in which case the built-in terminator for that port is simply switched on. When a CHANNEL starts or finishes at any other type of node (that is, the ROUTER is in the middle of that CHANNEL), then an external Terminator should be connected at this point. No more than two terminators are to be connected to a channel to avoid excessive attenuation of data signals which could result in loss of data.

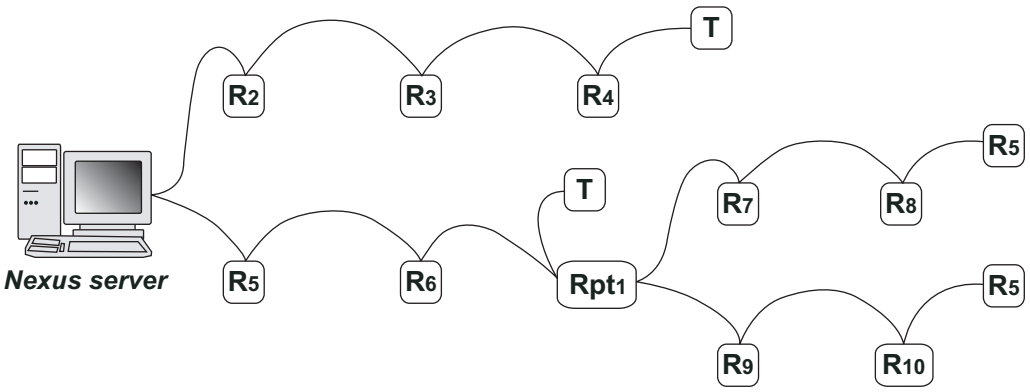
Repeaters

A REPEATER connects two sections of a CHANNEL together to extend the length of the CHANNEL. This may be necessary where a cable run is to be longer than 1000m (3,250ft) or when more than 50 SPUs (limit 100 SPUs) are to be connected to the same CHANNEL.

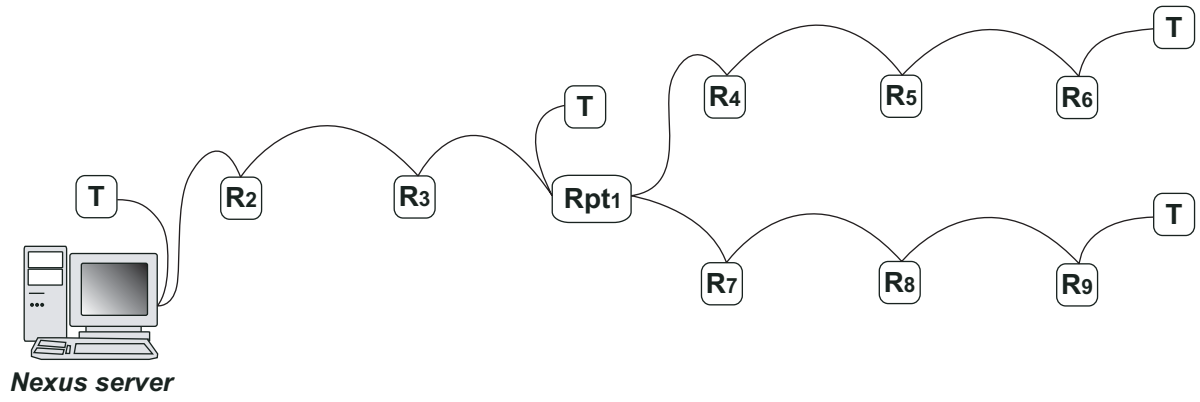
The REPEATER transfers and repeats all data packets from one section of the CHANNEL to the other and boosts the signal strength in the process. It counts as 1 NODE on each section of the CHANNEL.

Following are examples of how ROUTERS and REPEATERS are placed in a NEXUS system.

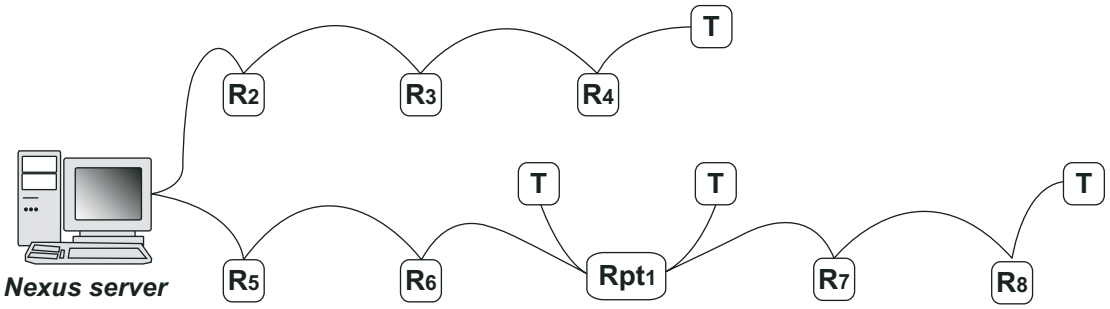
Example Router/Repeater Configuration 1 (Trunk):



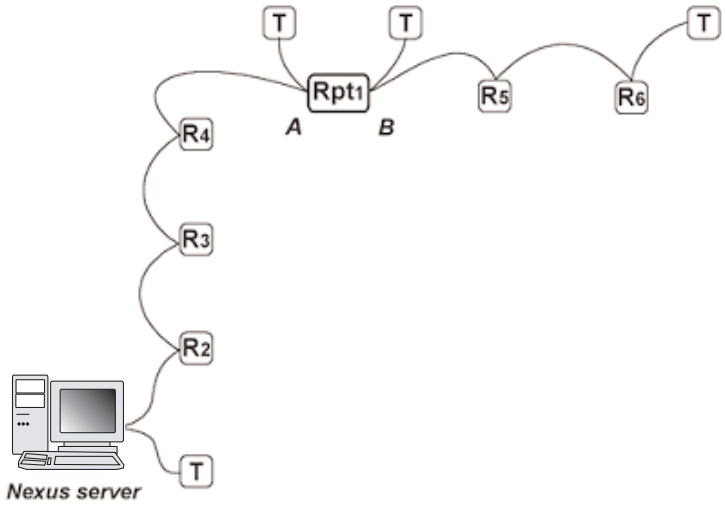
Example Router/Repeater Configuration 2 (Trunk):



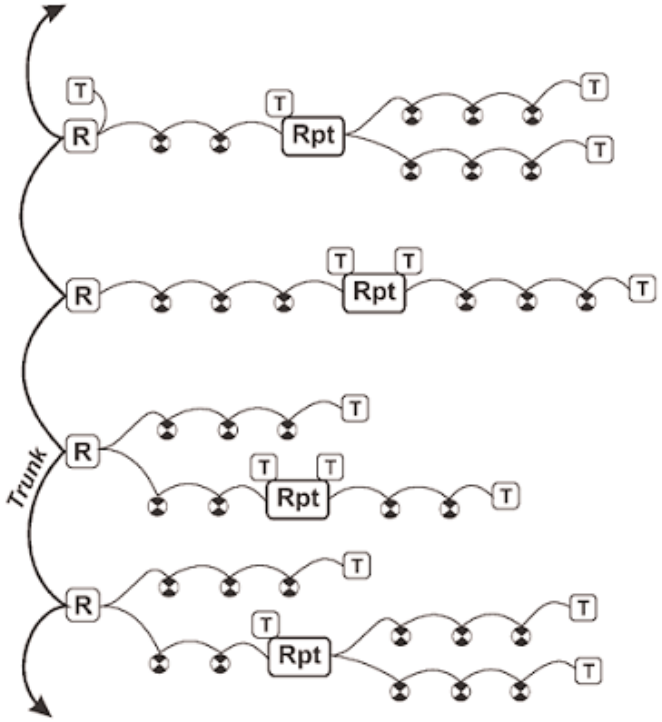
Example Router/Repeater Configuration 3 (Trunk):



Example Router/Repeater Configuration 4 (Trunk):



Example Router/Repeater Configuration 5 (Channel Branch):



Power Connection

Each unit is supplied with a 120VAC 3 pin input, 9VDC output plug pack power supply. The negative output terminal is connected to the AC supply ground. The DC power plug should be connected to the power socket marked as LOOP IN. When a number of ROUTERS are installed in the one spot they can be supplied from the one power supply. Up to 5 ROUTERS can be supplied by one 02-NRAS001 Plug Pack.

Use the power jumper lead supplied with each router to connect LOOP OUT to LOOP IN for successive ROUTERS.

Connecting Emergency Lighting Fixtures to the Network

See instruction sheet inside of SPU box.

Initial Testing of Emergency Lighting Fixtures

It is the responsibility of the installer to conduct the initial discharge test as soon as possible after connecting permanent supply to the emergency light. You will need to keep your own records of the initial test. If the SPUs are not to be left permanently connected to the AC supply, the installer is then responsible for conducting the initial the initial test when the SPUs are permanently connected to the AC supply. T&B conducts the initial test during final commissioning as part of the system package provided the installer has successfully completed the initial discharge test. T&B is not responsible for the initial discharge test unless separately contracted.

WARNING:

- Continuously switching the AC supply on and off to the SPUs during the installation process (for example, due to building works) will cause the SPUs to discharge and charge their batteries many times over a short period. This may shorten the life of both the battery and the lamp/s.
- T&B does not recommend such practices, and may not honour any warranty on the life of the batteries, when subjected to such harsh operating conditions.
- The SPUs are designed to be regularly discharge tested every month for 5 minutes and every year for full discharge.
- Excessive discharge testing is an abuse of the fittings.
- It is the installer's responsibility to ensure compliance with the NEC and Local Codes.
- The data terminals are unpolarized which means that it does not matter which wire goes into which terminal as long as like coloured conductors are twisted together and connected to the same data terminal. The other like-coloured conductors of the pairs are twisted together, and go into the other data terminal.

Preparation for Commissioning

This section of the Installation Guide describes what you must complete prior to commissioning.
As part of the System Contract, T&B Customer Service provides on-site attendance to assist the installer when the project is commissioned

Before calling T&B (or their authorized agent) for commissioning of the project, you must ensure that the following steps have been taken and that you have all the information ready for data entry to the NEXUS database. You should have:

- Completed and checked the accurate plan drawings showing the as-installed location of every SPU, Router, Repeater, Channel cable route, Trunk cable route and NEXUS Server.
- Fully completed and printed the database installation information list.
- Successfully installed, connected, tested and repaired all communication cabling for Channels, Trunks, and equipment as described in this guide.

Commissioning is the process of using the NEXUS Server to communicate with the SPUs over the network, to register and log the SPU network address data into the NEXUS database on the NEXUS Server.
The installation and location description details are entered into the database to marry with the SPU data to enable NEXUS users to quickly locate and identify any item that requires service or attention.

The Commissioning process generally proceeds as follows:

- The SPUs have been installed and energized for at least 24 hours (to ensure an adequate battery charge state).
- Each Channel has been installed and successfully communications wink-mode tested.
- The Trunk, Routers and Repeaters (if required) have been installed, energized and successfully communications tested as per the instructions in this Installation Guide.
- The NEXUS Server is installed, connected and tested.
- The NEXUS hardware interface is installed, connected and tested.
- The NEXUS software program is installed, configured and tested.
- The SPUs are commissioned into the database.
- The installation details are entered into the database.
- NEXUS is tested as a System.
- NEXUS is ready for the next stage of the project, End User operation.

Data Cable Connection

Experience has shown that nearly all problems encountered with the operation of a NEXUS system are caused by incorrect wiring of the data cable network. Incorrect cabling will lead to poor or no data communications.

The most common causes of problems include:

- Wrong DATA CABLE type.
- Wrong wiring topology (e.g. a “T” or star connection made at a node).
- Incorrect use of terminators.
- Incorrect connection of cable shields.
- Intermittent joins due to loose connections.
- Intermittent joins due to over-tightened damaged connections.
- Data cable proximity to electromagnetic noise sources.

NEXUS Support

Congratulations, you have reached the end of the installation stage. A blank emergency lighting installation database list is appended to this guide. You can copy and use it during installation.

If you require any further assistance, telephone the T&B Product Support Help Hotline as listed below.

PRODUCT SUPPORT HELP HOTLINE

Tel.: 1-888-552-6467 ext. 547

Fax: 1-888-867-1566

APPENDIX I
Glossary of Terms

BITS PER SECOND (BPS)

The term used to describe the speed of data transfer in digital form from one location to another. Usually described in units of thousands - Kilo (K), or millions - Mega (M).

CHANNEL

A section of LEVEL 4 (or better) data communication cable used as the physical transport medium for Packets of data. Limited to no longer than 1 Km terminated at both ends with signal TERMINATORS and with a maximum of 60 NODES connected to it. More than that will overload the CHANNEL and degrade signal performance. T&B recommends only 50 SPU's (nodes) per CHANNEL to allow for future expansion to the installation.

CHANNEL SEQUENCE NUMBER

Identifies each fitting as a function of its CHANNEL and its place on that CHANNEL. For example, the first fitting on CHANNEL 2 will have a Channel Sequence Number of 2-1.

DATA CABLE TYPE 4

A specially manufactured twisted pair communications cable. Designed to handle over 16 Mbps of high-speed data over a cable distance of up to 90 metres. For the T&B NEXUS System, at 78 Kbps can handle distances up to a maximum of one Kilometre (Km) of cable run per CHANNEL.

DATA CABLE NETWORK

The interconnection (networking) of many discrete components in many different locations with a common DATA CABLE. For NEXUS, the NETWORK is connected using the ECHELON LONWorks distributed Network Control System twisted pair cable multi-drop or tree-like, bus method composed of a TRUNK and CHANNELS.

ECHELON

The name of the corporation that developed the LONWorks communications networking and control system, LONTalk protocol and Neuron Chips in conjunction with MOTOROLA.

ELECTROMOTIVE FORCE (EMF)

The term commonly used to describe electrical energy, usually as a pulsing magnetic radiating electrical field like a radio wave. An EMF can be induced into an electrically isolated wire if a magnetic field passes through it. If a wire is run parallel with an alternating current carrying cable, an EMF is induced into the wire. If a DATA CABLE is run parallel with mains carrying cables, an EMF is induced in the DATA CABLE. This induced EMF could interfere with the flow of the data packets. Also known as EMF.

EMERGENCY LIGHTING NODE (ELN)

The communications printed circuit board assembly that connects an ELN SPU to the DATA CABLE.

LIGHT EMITTING DIODE (LED)

Small electronic low level coloured light source that acts as a status indicator. Used in emergency lights to indicate power connection, battery charging or data signalling.

LOCAL OPERATING NETWORK (LON)

The proprietary name used by ECHELON for their distributed control, Neuron based communications NETWORK.

LONTalk

The proprietary communications Network protocol created by ECHELON for embedded use in Neuron chips.

LONWorks

The complete communications networking and control system including software, firmware, silicon and hardware produced by ECHELON to enable third party development and use of ECHELON LON system products.

NETWORK CONTROL SYSTEM (NCS)

The T&B implementation of the LONWorks package developed to install, monitor and control the NETWORK for the remote operation and monitoring of T&B intelligent emergency light fittings.

NEURON

The name given to the micro-controller silicon chip developed by ECHELON, manufactured by MOTOROLA and TOSHIBA, that forms the basic component in every LON NODE. Each Neuron chip contains a permanent world-wide unique 48 bit encoded Neuron identification number, 3 microprocessors each dedicated to a different function, on board memory and built in Network communications ability with a common, message-based control LONTalk protocol to process inputs from sensors and control devices intelligently.

NEXUS Server

The PC used to interface between the system and its user. The NEXUS PC consists of a STANDARD PC with an internal Ziatech interface card or an external ECHELON Serial LONTalk adaptor connected to the T&B NEXUS DATA CABLE NETWORK, for the operation and control of the NETWORK devices via the NEXUS Software. Can be operated remotely via a modem. Used to send instructions to and to receive status from the NEXUS NETWORK. Stores the database of fitting details, status, test results and logbook. Data can be viewed on screen, saved to disk or printed if required.

NODE

The intelligent NETWORK device that connects to the NETWORK cable through 78 Kbps transformer isolated transceivers and functions as a source or destination of PACKETS of communication data. Every NODE contains a NEURON chip. This along with other software and firmware coded addresses, allows each NODE to be contacted over the NETWORK, individually or in groups.

PACKET

A defined quantity of data transmitted on the NETWORK to LON specifications. Forms a complete message including source and destination addresses with command instructions and data. All NETWORK data is in PACKETS.

POWER OUTLET

An enclosed assembly that may include receptacles, circuit breakers, fuse holders etc. to serve as a means for distributing power required to operate mobile or temporarily installed equipment; Normally 120 volt 60Hz.

REPEATER

Connects two sections of a CHANNEL together to extend the length of a CHANNEL for the necessity of either a cable run longer than 1Km, or to allow between 50 and 100 SPU's to be connected to the same CHANNEL. Transfers and repeats all data Packets from one section of the CHANNEL to the other and boosts the signal strength in the process. Counts as 1 NODE on each section of the CHANNEL.

ROUTER

The device that connects a branch CHANNEL to the main TRUNK. Selectively transfers data PACKETS from one CHANNEL to the other (and boosts the signal strength in the process), when the NETWORK destination address of the PACKET lies on the other side of the ROUTER. The advantage of this device is that it reduces NETWORK activity (traffic) because it only relays the data if the recipient or sender is located on its CHANNEL. All fittings broadcast their data PACKET messages on their CHANNEL and the ROUTER rebroadcasts it onto the TRUNK. Once there, all of the other ROUTERS can hear the message, but only the one that has the recipient on their CHANNEL will relay it onto its separate CHANNEL.

ROUTER / REPEATER TYPES

If installed as a router the near side is the trunk side

If installed as a router the far side is the channel/branch side

If installed as a repeater in a channel/branch the near side is the one closest to the router

If installed as a repeater in a channel/branchthe far side is the one furthest from the router

If installed as a repeater in the trunk the near side is the one closest to the NEXUS Server

If installed as a repeater in the trunk the far side is the one furthest from the NEXUS Server

Router / Repeater types:

Type	Near Side transmission speed	Far Side transmission speed
Standard Router	78kbps connected to recommended copper data cable	78kbps connected to recommended copper data cable
Standard Repeater	78kbps connected to recommended copper data cable	78kbps connected to recommended copper data cable
1.25Mbps Router	1.25Mbps connected to recommended copper data cable	1.25Mbps connected to recommended copper data cable
1.25Mbps Repeater	1.25Mbps connected to recommended copper data cable	1.25Mbps connected to recommended copper data cable
FTR Router	78kbps connected to recommended copper data cable	Multimode Fibre optic cable particular specifications
Etherlon Router	78kbps connected to recommended copper data cable	Standard TCP/IP network (Ethernet)

FTR Router / Repeater:
Contains fibre optic transceiver (FTR) and a standard 78kbps twisted pair copper transceiver. Can be configured as a router or repeater with either fibre or copper transceivers connected as near side or far side.

Etherlon Repeater:
Contains Ethernet transceiver and a standard 78kbps twisted pair copper transceiver. Can be configured as a repeater with either Ethernet or copper transceivers connected as near side or far side.

SINGLE POINT UNIT (SPU)

The term for an emergency light fixture (unit) that stands alone (at a single point) and includes its own rechargeable battery and charger equipment. When normal AC power to it fails, it automatically energises its emergency lamp until the power is restored or the battery discharges.

TERMINATOR

All small packaged Resistive/Capacitive (RC) printed circuit board (PCB) that must be attached to the very ends of every CHANNEL in the DATA CABLE NETWORK. These ensure that the signals on the NETWORK are not corrupted by unwanted reflections (noise) from transmission live discontinuities.

TRADEMARKS

WINK MODE

The data control method that causes the SPU LEDs to pulse alternating YELLOW-ORANGE/OFF. It is the mode the NEXUS uses to check for correct NETWORK communications to indicate whether the SPU's are receiving data.

APPENDIX II

PROJECT: **DATE:**

CH SEQ #	LOCATION DESCRIPTION			DRAWING		SPU type/	DB	CB	Ch	Grp
	Bldg	Level	Area/Zone	Plan #	Grid #	Catalogue #	#	#	#	#
Sample										
2-1	Admin	Ground	West corridor near elevators	ABC123	D-12	SFNXS10	2	12	2	2

Legend: **DB** Distribution box **CB** Circuit braker **Ch** channel **Grp** Group

Photocopy this blank sheet and use it to keep track of the NEXUS database information required for commissioning and database entry. A separate sheet should be used for each channel; each sheet provides space for up to 50 SPU's. T&B recommends a maximum of 50 SPU's per Channel or up to 100 per Channel where a REPEATER is used in accordance to page 19 NEXUS Installation Guide.

APPENDIX III

SPU LED Colour Meanings

Every NEXUS SPU has a tricolour LED with the following possible states:

OFF	SPU not powered, or Battery not charging, or Lamp not present or failed Still in last state when wink-mode stopped and SPU commissioned (press button or run short test or turn power off and on to reset).
RED steady	Neuron chip power-up self-test result faulty.
RED pulsing (Red/Off)	SPU uncommissioned (unconfigured) and otherwise normal.
GREEN steady	SPU commissioned (configured),battery charging and lamp present. This is the normal final working state.
GREEN pulsing (Green/Off)	SPU commissioned and under test.
YELLOW-ORANGE steady	SPU commissioned but still in previous wink-mode state (press button or run short test or turn power off and on to reset).
YELLOW-ORANGE varying in intensity	SPU uncommissioned before wink-mode state. When wink is stopped, the LED is locked on orange, with the uncommissioned pulsing RED in the background (press button or run short test or turn power off and on to reset).
YELLOW-ORANGE pulsing consistently @ _ second rate: YELLOW-ORANGE / OFF pulsing YELLOW-ORANGE / (RED or OFF) pulsing	• Commissioned and under wink-mode command. • Uncommissioned and under wink-mode command . (Pulsing Red/Off is normal uncommissioned state and pulsing YELLOW-ORANGE/Off is wink-mode state, so both together will vary from YELLOW-ORANGE/Off to YELLOW-ORANGE / (RED or OFF) depending on the different rates of pulse and the times they overlap each other).
YELLOW-ORANGE pulsing intermittently @ other than _ second rate: (YELLOW-ORANGE/ NOT YELLOW-ORANGE)	Under wink-mode command and some network messages are being lost. The possible causes of which are: • The DATA CABLE is broken. • The DATA CABLE has a short. • The DATA CABLE is not termina ted properly at one of the devices. • If shielded cable used, the shielding is not terminated properly. • The CHANNEL cable is not termina ted properly at one or both ends. • The CHANNEL cabling is incorrectly wired with a tee-off branch. • The CHANNEL cabling is too long for the cable characteristics. • There are too many SPUs in the CHANNEL. • There is too much 'noise' on the CHANNEL. • One of the devices is faulty.

NOTE: *To make the LEDs on the SPUs pulse YELLOW-ORANGE/Off in Wink-Mode a command is broadcast over the system every half second to instruct the SPUs to change the state of their LED. If one of these instructions does not reach an SPU, then it will not make the LED change on time and so will appear to either stay 'on' longer or stay 'off' longer than half a second. This could happen as regularly as every alternate pulse or vary to only 1 in 10 pulses depending upon the number of network messages being lost and on the reason for the loss.*

Unit Status According to LED colours	UNCOMMISSIONED	COMMISSIONED
NORMAL	RED /OFF pulsing	GREEN steady
UNDER TEST	N/A	GREEN/OFF pulsing
WINK MODE	YELLOW-ORANGE/(RED or OFF) pulsing	YELLOW-ORANGE/OFF pulsing
NEURON FAULTY	RED Steady	RED Steady
POWER FAILURE	OFF	OFF

NEXUS Guide Feedback Sheet

T&B strives for excellence in product design, manufacture, quality and service. Should you have any comment to make about this NEXUS Guide, or any other pertinent matter, we would like to hear from you. Please photocopy this page, fill in your contact details, write your comments below, then either fax or post it to us. We need your feedback to assist us in evaluating what we do, to see if we could do it better. Thank you.

Date:

To: T&B

From:

Telephone:

Company:

Project:

Comments:

NEXUS Support

If you require any further assistance, contact the T&B Product Support Help Hotline in Montreal as listed below.

Tel.: 1-888-552-6467 ext. 547
Fax: 1-888-867-1566

NEXUS DESIGN & INSTALLATION GUIDE

Please refer to your local building, electrical or fire authority for accurate municipal codes.

All informations and specifications contained in this guide are subject to change with out notice.

This Guide is part of a series of user-friendly guides to help you design, install, commissioning, maintain and operate the NEXUS System.

NEXUS

Wherever you are, you can depend on Nexus to get the job done!

What is NEXUS ? :
For Thomas & Betts, **NEXUS** is a real-time network management system for emergency lighting and exit signs. It enables the user to manage the entire installation – installing and removing components, testing and monitoring the system and managing maintenance activities thus saving time and money on maintenance.

Contact us:
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