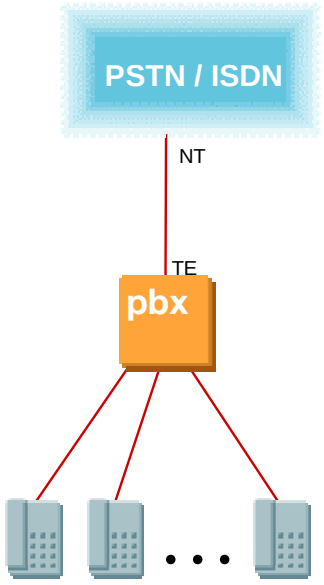
Information Note
Connecting a BRI - checklist

When connecting a Vega to a BRI device there are a number of steps that need to be followed in order to ensure that the link will come up and the system will operate correctly.

Trunk interface (DSL) configuration

In ISDN, an NT – NeTwork – device must be connected to a TE – Terminal Equipment – device; NT must connect to TE.

For example the PSTN/ISDN will be NT – NeTwork – and the trunk interfaces of a PBX will be TE – Terminal Equipment.



For a Vega to operate correctly, it must have its trunks configured NT / TE appropriately; NT if it is to connect to a TE device and TE if it is to connect to an NT device.

By default Vega gateways are configured with alternate trunks configured TE and NT, IF:01 = TE, IF:02 = NT, … etc. so often it is possible to use default Vega configuration.

(If you need to change the configuration, see the appropriate step-by-step initial configuration guide)

Hardware connectivity

Use the diagrams in Annex 1 to correctly wire in your Vega 50 BRI.

Note Vega 50 BRI uses different cables depending on whether a trunk is being connected to an NT or a TE device. N.B. Do Not use Vega 100 or Vega 400 cables – the pinout is completely different to BRI cables.

The 'channel' LEDs on the Vega 50 BRI indicate the connectivity status of the line.

- If the LED is off – there is either no cable connection, or the cable is wrongly wired.
- If the LED is flashing, layer 1 (the physical layer) has connected OK, but signalling layer 2 has not connected properly.
- If the LED is solidly on then the signalling layer 3 has connected correctly.

Note: BRI devices often take layer 2 down between calls. It is therefore acceptable for the relevant channel LED to be flashing when there is not a call in progress on that trunk.

Termination of BRI lines and number of devices on the line

Electrically, BRI lines should be terminated using terminating resistors at both ends of the BRI (S0) bus. If BRI lines are not properly terminated, reflections of signals on the lines can make the signalling and media connection unreliable

Vega 6x4 BRI gateways have terminating resistors built in, so external terminating resistors are not required.

On Point-to-Multi-Point busses where there are multiple BRI devices attached, ensure the bus is terminated at the ends only and that none of the mid-point BRI devices have termination resistors enabled (i.e. put the Vega at the end of the bus).

Do not exceed the maximum of 8 devices on the line (S0 bus).

Point-to-Point, Point-to-Multi-Point and TEI

BRI lines can be configured in Point-to-Point mode or Point-to-Multi-Point mode. Point-to-Point mode is used where it is known that only a single device will be connected to the line. Point-to-Multi-Point is used where, for example, multiple telephones or ISDN / data adaptors may be connected to the line.

Generally a line supplied to connect to a PBX will be Point-to-Point (but this is not always the case), and a line supplied to connect to ISDN handsets will be Point-to-Multi-Point.

When connecting the Vega, it must be configured the same as the device(s) that it is connecting to. If the other device is in Point-to-Point mode, the Vega must be set to Point-to-Point mode, and if the other device(s) is configured in Point-to-Multi-Point mode, the Vega must also be configured as Point-to-Multi-Point.

In Point-to-Multi-Point mode the Vega and the other devices will automatically negotiate their TEI (Terminal Endpoint Identifier) values – leave the Vega configured for TEI=64.

In Point-to-Point mode, the TEI value of the Vega must be statically configured. Configure the Vega to have the same TEI value as the far end device (in the range 0 to 63).

If you do not know the TEI value of the far end, a good starting point is to try a TEI of 0, otherwise take an ISDN trace and look at the TEI value in the messages sent by the other device.

[NEC XenMaster BRI trunks are point-to-multipoint – they cannot be configured for poit-to-point operation even though they usually connect directly to the ISDN]

Layer 2 restart

In order to allow layer 2 to be taken down between calls:

- set _advanced.isdn.restart_l2_after_disc=0

If this is not set, then event logs (and SNMP) will report the ISDN trunk regularly going down and being brought back up again.

As a rule of thumb, Point-to-Multi-Point trunks can be expected to take layer 2 down between calls, and Point-to-Point trunks typically keep layer 2 up, but this is only a guide.

Bus master

In order to keep synchronised the Vega should synchronise itself with a master clock – typically the PSTN clock. Generally TE trunks receive the clock and NT trunks are 'clock masters'.

If a Vega trunk is not synchronised, then there will be 'SLIPs' – to check for SLIPs, use 'show ports'. One or 2 slips often occur at start up – this is acceptable; if the slip count keeps increasing, there is a problem that needs to be resolved.

See Information Note 'IN03 – ISDN clocks' for details about how to configure clocking and Bus Master.

Further configuration

To configure your Vega for use, see the appropriate step-by-step initial configuration guide and / or the step-by-step guide 'insert Vega between PSTN and PBX'

Trouble-shooting

No physical connection (LED off)
- check that NT is connected to TE and TE is connected to NT
- check whether a crossover is needed
- check exact cabling pinouts
  Rx+ connects to TX+
  Rx- connects to TX-
  Tx+ connects to Rx+
  Tx- connects to Rx-
- if still problems take an ISDN trace (see Annex 2) – especially look for SABMEs

No layer 2 (LED flashing)
- N.B. this is acceptable for BRI when no calls are in progress on a trunk
- If calls are not handled correctly, consider pmp / pp
- take an ISDN trace (see Annex 2) – especially look for SABMEs

Layer 2 up (LED flashing / on), call disconnects with error code 38
- check that the call is being routed to a trunk that is 'up'

Layer 2 up (LED on), outgoing call to ISDN is rejected by the network

- check that the caller ID being presented in the outgoing ISDN call is a valid caller ID for that trunk. Some network operators check the caller ID on outgoing calls and reject calls if an invalid caller ID is being presented (other network operators just over-stamp caller ID with the Trunk caller ID).

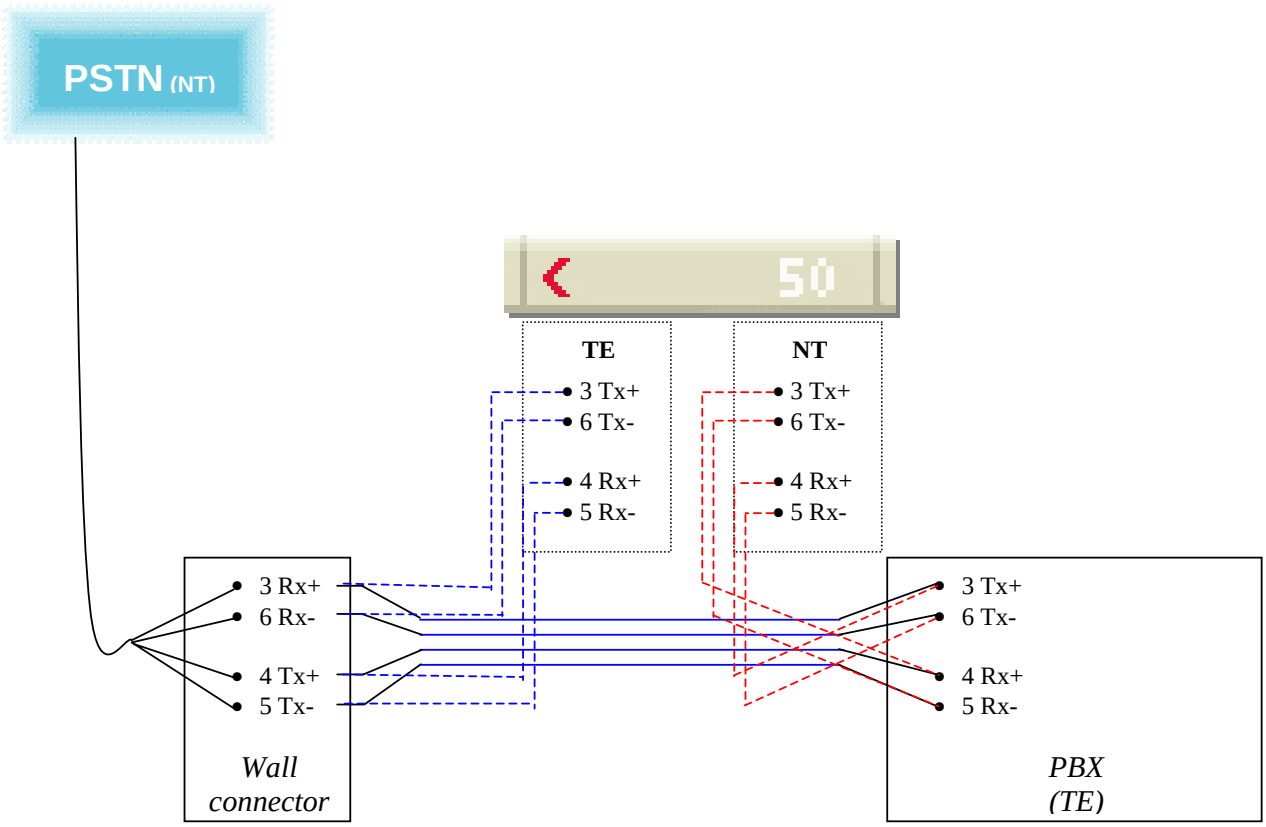
Layer 2 up (LED flashing / on), some calls work, others don't

- If the link is Point-to-Point and the Vega is set at its default Point-to-Multi-Point then the Vega will accept calls, but outbound calls will fail.

- take an ISDN trace (see Annex 2) – especially look for differences in the SETUP (and other) messages between working and non-working calls.
- for instance
  - Channel ID preferred / exclusive – choice sometimes matters (see _advanced.isdn.chanid_excl)
  - Type of Number, Numbering Plan, and screening information can be important – generally these should be configured as 'supplied' so that they are passed through from inbound call to outbound call. They can be overriden on a per trunk basis (advanced > setup_mapping > called party number / calling party number) or on a per call basis (planner.post_profile)
  - Bearer capability – generally this should be passed through but it can be overriden on a per trunk basis (advanced > setup_mapping > bearer capability).

Annex 1

Physical connectivity of a Vega 50 BRI



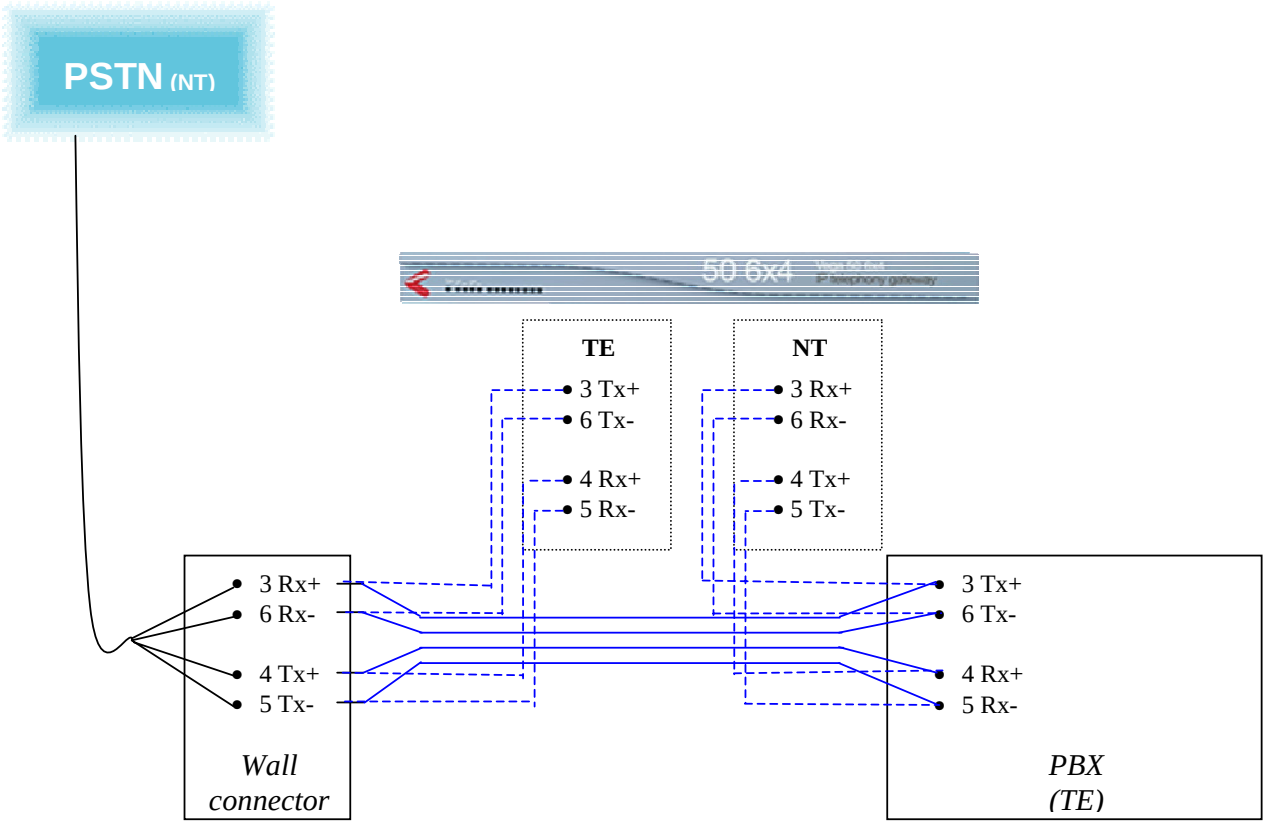
Cable pinouts

Cables with RJ48 plugs are used to connect to the Vega 50 BRI's ISDN ports. The pinout of each Vega 50 BRI interface is hardwired as TE. A (BLUE) straight through cable is used to connect a TE Vega DSL to an NT far end device. A (RED) cross-over cable is used to connect an NT Vega DSL to a TE far end device.

Vega 50 BRI	Far end device	
TE (physical)	NT	TE
3 (Tx+)	3 (Rx+)	4 (Rx+)
6 (Tx-)	6 (Rx-)	5 (Rx-)
4 (Rx+)	4 (Tx+)	3 (Tx+)
5 (Rx-)	5 (Tx-)	6 (Tx-)

For Loopback between a Vega NT port and a Vega TE port, use the RED cable

Physical connectivity of a Vega 50 6x4 BRI



Cable pinouts

Cables with RJ48 plugs are used to connect to the Vega 50 6x4 BRI's ISDN ports. The pinout of each Vega 50 6x4 BRI interface automatically changes from NT to TE depending on the configuration setting in the Vega. A (BLUE) straight through cable is used to connect an NT Vega DSL to a TE far end device, and the same (BLUE) straight through cable is used to connect a TE Vega DSL to an NT far end device.

Vega 50 BRI	Far end device
TE	NT
3 (Tx+)	3 (Rx+)
6 (Tx-)	6 (Rx-)
4 (Rx+)	4 (Tx+)
5 (Rx-)	5 (Tx-)
	VegaStream provided cables (ISO 8877)

Vega 50 BRI	Far end device
NT	TE
3 (Rx+)	3 (Tx+)
6 (Rx-)	6 (Tx-)
4 (Tx+)	4 (Rx+)
5 (Tx-)	5 (Rx-)
	VegaStream provided cables (ISO 8877)

For Loopback between a Vega NT port and a Vega TE port, use the BLUE cable

Annex 2

ISDN trace

Follow the guidelines in the Information Note 'IN 04 - Low level ISDN trace' to take the trace.

If there are link start up problems, look for SABMEs
Both NT and TE devices should send SABMEs, though typically NT devices will send the SABME earlier than the TE device.

Within the SABME there is a command_response bit.

- For a SABME sent NT to TE, the command_response bit =1
- For a SABME sent TE to NT, the command_response bit =0

A SABME should be responded to with a UNNUMBERED ACK.

Once the link is up, layer 2 RECEIVER READY messages should be seen. These can be initiated by both NT and TE devices. They should be responded to immediately by a RECEIVER READY message from the other device.

- For a RECEIVER READY command sent NT to TE, the command_response = 1
- For a RECEIVER READY command sent TE to NT, the command_response = 0
- For a RECEIVER READY response sent NT to TE, the command_response = 0
- For a RECEIVER READY response sent TE to NT, the command_response = 1

Finding the TEI

- Look at a layer 2 message in the DETAIL DECODE section; the 'tei' is labeled

Contact Details
Email: support@vegastream.com
Web: www.vegastream.com
www.vegaassist.com

EMEA Office
VegaStream Limited
Western Centre
Western Road
Bracknell
Berks RG12 1RW
UK

+44 (0) 1344 784900

USA Office
VegaStream Inc.
6200 Stoneridge Mall Road
3rd Floor
Pleasanton
California 94588
USA

+1 925 399 6428