

Cable Toning Techniques

Using IntelliTone™ Pro Toners and Probes

IntelliTone Pro is a toner and probe solution which uses both digital and analog signaling to zero in on elusive cables. This powerful combination allows it to perform optimally in virtually any work environment.

Datacom network moves, adds and changes

In recent years, installation of structured cable has been to uniform standards. The TIA-568A standard requires all work areas be wired with a minimum of two jacks with the horizontal cabling being four-pair 100 ohm UTP. This typically consists of two or more Cat 5e cable runs directly from a wall plate jack to a patch panel.

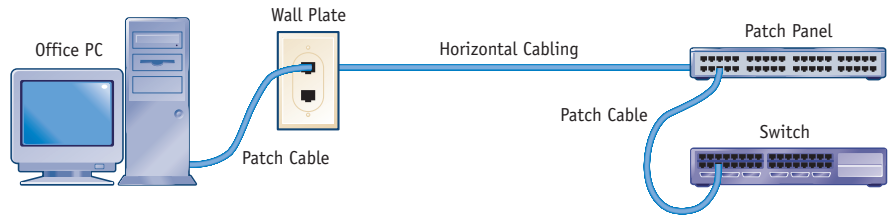
Plugging in

IntelliTone is a digital toning system featuring an 8-position modular jack. This allows the toner to be plugged in either at the wall jack with the included patch cable or, if the wall jack is obstructed but connected, the patch cable can be removed from the PC and plugged directly into the toner.

Wall jacks are often unmarked or misconnected. Adding to the confusion, the 8-position modular jack can be used for either data or telecom services.

Service ID provides the first clue

The IntelliTone Pro 200 Toner features a service ID indicating the presence of service on the line. When plugged in to a wall jack, it provides the first indication of where to look for the cable in the closet. A 4-position jack is sure to be telecom service, whereas an 8-position jack could be telecom or data (network) connection. The presence of telecom service typically means looking for the signal on a



Datacom wiring scheme

110 block with an active connection to the phone system.

The presence of Ethernet indicates the connection is active and best located on the patch cables from the patch panel to the switch.

If the connection is open then it's likely not patched or connected. If the open LED is extinguished, the toner is detecting a connection across the center pins of the jack. This could be an unplugged network device or unrecognized service.

Locating in the closet

The tone can be located on unpatched connections by moving the probe from jack to jack on the patch panel. It is typical to get a reading of 4-6 in locate mode with the black probe tip inserted into the jack. Neighboring jacks and cable will exhibit lower signal levels as indicated by the LED display (Figure 1).

If the service identification in the office indicated an Ethernet connection, the user should begin probing the cables that are patched to active network equipment. It is typical to get a reading of 7-8 on the toned cable (Figure 2).

Once the cable is located, the IntelliTone Pro 200 probe provides a Cablemap to assure correct pin-to-pin wiring. By removing the patch cable from the switch, or by plugging a patch cable into the patch panel jack, the complete end-to-end wiring can be verified for opens, shorts, or mis-wires (Figure 3).

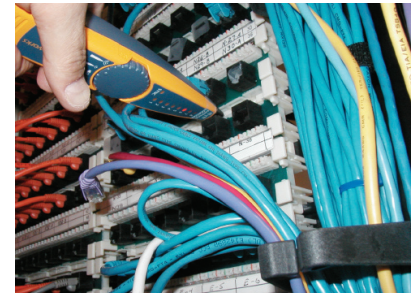


Figure 1

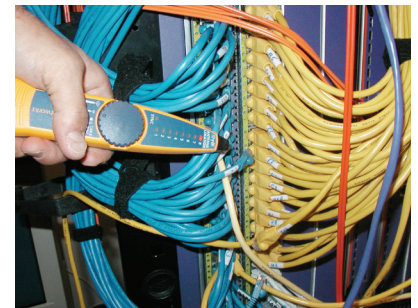



Figure 2



Figure 3

When in tight spaces or in the presence of bleed, the isolate position  will help eliminate bleed and provide more granularity on the stronger LEDs. This will aid in differentiating the toned cable or jack from its neighbors by providing a couple of LED levels of difference in strength. Additionally, Cablemap always provides a definitive indication of the toned cable.

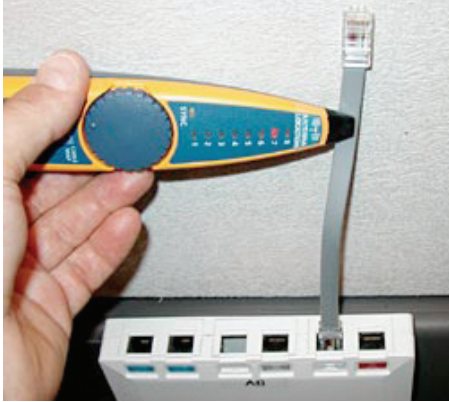


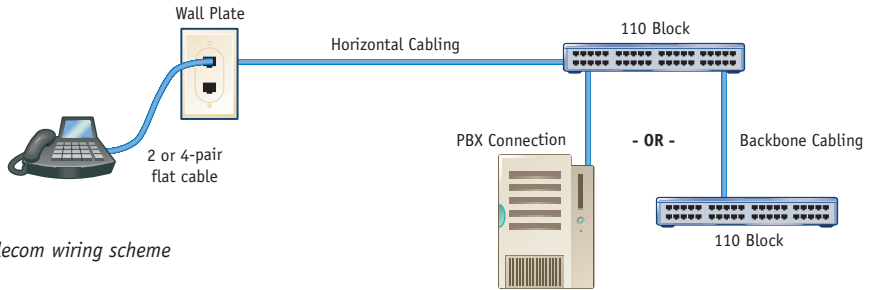
Figure 4

Toning from the closet to office jack

Occasionally, toning may be performed from the patch panel to the office jack. If the jacks are very closely spaced or it is difficult to insert the probe tip in the jack, there may only be one or two levels of signal strength difference. If more differentiation is required for extremely close jacks, a short patch cable can be used to effectively distance the jacks by probing the cable as it is moved from jack to jack (Figure 4). The same patch cable can then be used to validate the correct cable using the Cablemap feature on the IntelliTone Pro 200 probe.

Telecom network moves, adds, changes using IntelliTone Pro

Most office installations consist of a one or more data and telephone drops. On the telecom side, there can be a variety of jacks and wiring schemes ranging from a single pair on a 4-position wall jack to 4 pairs connected from the 8-position modular jack to the terminating block.



Telecom wiring scheme

Wiring schemes

In the office, the wall plate jack may be 6 or 8-position, with the 6-position jack having 4 or 6 pins. Horizontal cabling uses 1, 2, 3, or 4 pairs and can range from Category 3 to Category 5 cable. In the closet, the horizontal cabling will typically terminate on a 110 block, or in older sites a 66 block. The block may be directly connected to the PBX if this is the main distribution frame (MDF), or cross-connected to another location if this is an intermediate distribution frame (IDF). Current practice, per TIA-568A standard, consists of an 8-position jack in the office with 4-pair 100 ohm UTP connected to a 110 block.

Plugging into a jack

The IntelliTone Pro toner features an 8-position modular jack that accepts 4, 6 or 8-position male plugs. The included 4 and 8-position patch cables allow the toner to be plugged into the wall jack.

If the wall jack is obstructed but connected, the patch cable can be disconnected at the phone, and the male plug, be it 4, 6 or 8 position can be connected directly to the toner female jack.

Plugging in to a 66 or 110 block

There are a variety of ways to connect the toner to the pair. The supplied alligator test leads make bare wire attachment possible. For piercing wires, Fluke Networks offers the MT-8203-20, a telecom five-way alligator lead set with a bed of nails.

The telecom five-way alligator lead set also offers a secure attachment to 66 blocks using the U shaped nose for blade shaped terminals. It is also possible to use a 66 quick clip and connect to the toner using the 8-position modular plug.



Five-way alligator lead set with bed of nails



1 pair to 110 modulator plug patch cable



110 modulator plug



For 110 blocks, a standard 1-pair 110 to modular plug patch cable can be plugged directly into the toner modular jack. There are also various 110 test adapters that provide a modular jack for connection to the toner.

Isolate individual wire pairs

The IntelliTone digital signal is subject to significant bleed-over between pairs in a cable. This is especially true for Cat 3 cabling. Because of this, IntelliTone's analog mode is recommended for isolating individual pairs. SmartTone™ analog mode should be used because of its ability to change cadence when the pair under test is shorted. When the pair under test is not terminated, the copper conductors can be touched together briefly to cause a short.



When this happens, the tone will change its cadence to indicate that the correct pair has been located. If the pair is terminated on a 66 or 110 block, it may be necessary to short the pair together with a pair of insulated pliers.

In the distribution frame

In the closet, the telecom jack will typically terminate on a 110 block. The block may be directly connected to the PBX if this is the MDF, or cross-connected another location if this is an IDF. More recent installations, per the TIA-568 standard, consist of an RJ-45 jack in the office with all four pairs punched down on the 110 block. Locate the cable by touching wire with the tip, either the insulation or by making metallic contact.



Figure 5

Once located, the office wiring can be verified for shorts, opens and mis-wires using a standard 110 to 8-position patch cable and the Cablemap feature on the IntelliTone Pro 200 probe. The cables are readily available in 1, 2 and 4-pair 110 connection in TIA-568A, TIA-568B or Universal Service Ordering Code (USOC) formats. The Cablemap results will show the correct order when the patch cable matches the wiring scheme, be it TIA-568A, TIA-568B and USOC (Figure 5).

The IntelliTone Pro probe supports the time-honored practice of making contact with the finger. While often done on 66 blocks, it is possible to make the contact with the 110 connections using a metallic object. Using the body to conduct the signal is a good way to move the probe away

from noise sources and identify individual wires when metallic contact is possible.

Locating cables on an active PBX system

Some PBX lines generate signals in the operating frequency of IntelliTone as seen by the SYNC LED flashing red. In this case, it may be difficult for IntelliTone to differentiate the PBX signal from the IntelliTone signal. Once again, it is recommended to use IntelliTone's analog mode for this application. Make sure both the IntelliTone Toner and the IntelliTone Probe are in analog mode.

Moves, adds, changes completion

When returning to the office to retrieve the toner, the presence of the correct services on the correct jacks can quickly be verified using the IntelliTone Pro 200 toner Service ID feature. The verification of the correct patching and connection, including datacom or telecom services, can be performed prior to the computer or phone being present.

For more information on IntelliTone Toners and Probes, visit

www.flukenetworks.com/intellitone

