



Cable Testing Definitions

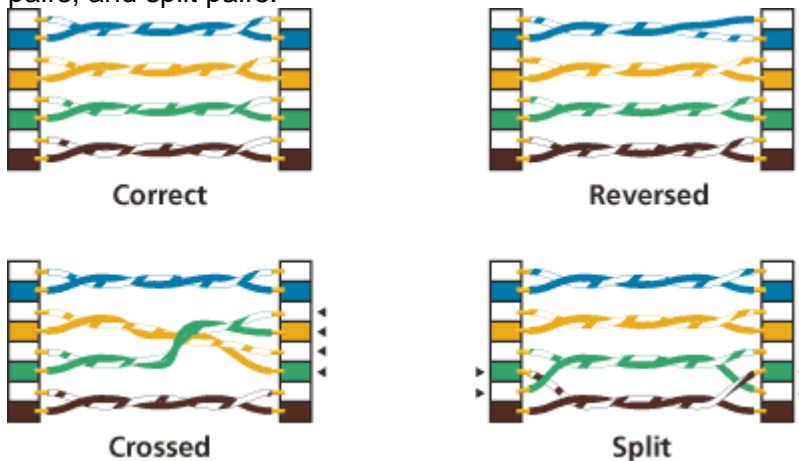
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Wiremap

Wiremap is used to identify installation wiring errors. For each of the 8 conductors in the link, wire map should indicate:

- Proper pin termination at each end
- Continuity to the remote end
- Shorts between any two or more conductors
- Crossed pairs
- Split pairs
- Reversed pairs
- Shorted pairs
- Any other miswires

A reversed pair occurs when the polarity of one wire pair is reversed at one end of the link (also called a tip/ring reversal). A crossed (or transposed) pair occurs when the two conductors in a wire pair are connected to the position for a different pair at the remote connector. Split pairs occur when pin to pin continuity is maintained but physical pairs are separated. Refer to the figure below for an illustration of correct pairing, a reversed pair, crossed pair, and split pairs.



Results Interpretation

In most cases you will expect to see straight through connections. With simple tools, such as LED display testers, a lamp will light up indicating a short or open. Advanced tests, such as reversed or split pairs, are often not available in such equipment. While these tools are usually adequate, it must be noted that a passing result does not necessarily guarantee a correct wiring installation. For example, split pair detection requires the measurement of NEXT or Impedance, which is beyond the capability of low-end testers. Split pairs will cause a high degree of NEXT (typically over 22 dB) which will severely limit available bandwidth on the installed cabling.

In the case of Screened Twisted Pair cabling you will need to verify screen continuity. This is usually only available on more advanced certification tools.

Wire map is a fundamental test, but it is important to note that correct wiring does not verify bandwidth performance. Frequency-dependent tests such as NEXT, attenuation, and return loss are key to ensuring cabling is capable of supporting high-speed applications.

Troubleshooting Recommendations

In the case of a wire map failure, a careful examination of the installation (IDC block or connector) will usually show that one or more wires have been transposed. Inspect and re-terminate as necessary.

If conductors are missing, it could be because they are unnecessary for the intended application. For example, 10BASE-T and token ring each require only four conductors. Some wiring designs purposely use one four pair cable to supply two RJ45 connections each with two pairs. The important issue is to ensure the installed cabling meets the required design criteria.

If an open conductor is found, use the length measurement capability of your cable meter to determine whether the open is at the near or far end to speed fault isolation and repair.

Length

Length is defined as the physical or sheath length of the cable. It should correspond to the length derived from the length markings commonly found on the outside jacket of the cable. Physical length is in contrast to electrical or helical length, which is the length of the copper conductors. Physical length will always be slightly less than electrical length, due to the twisting of the conductors.

To measure length, a test set first measures delay, then uses the cable's nominal velocity of propagation to calculate length. Nominal Velocity of Propagation (NVP) refers to the inherent speed of signal travel relative to the speed of light in a vacuum (designated as a lower case c). NVP is expressed as a percentage of c , for example, 72%, or $0.72c$. All structured wiring cables will have NVP values in the range of $0.6c$ to $0.9c$. Similarly, if you know the physical length and the delay of a cable you can calculate the NVP.

In most instances, length is derived from the shortest electrical length pair in the cable. Because of delay skew, the length of the four pairs often appears slightly different. This is normal and no cause for concern with the exception of significant (over 10%) variances.

Results Interpretation

The main concern when measuring length is that there is not a lot of cable in any segment. For horizontal structured cabling this means 100 meters. This is because applications have been designed to support a maximum signal propagation delay, and if the link is too long, this delay could be exceeded. Occasionally installers may leave excess cable in the ceiling or wall in anticipation of future needs. While this is okay if it is considered part of the overall run, tightly coiling excess cable can lead to undesirable performance degradation due to additional return loss and near end crosstalk.

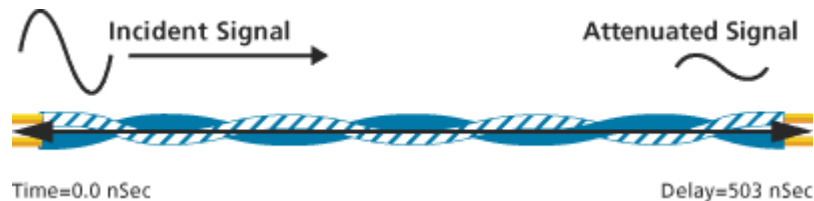
Troubleshooting Recommendations

One of the most common reasons for failing length on a test is that the NVP is set incorrectly. If you are not careful and use the preset cable type it may not match the NVP of the cable under test. In this case, you can have an NVP difference of 10% or more, which translates directly into a length error. In the event the length is only slightly too long, check the NVP and cable type.

Assuming the NVP is correct, another cause of excess length is extra cabling looped in the ceiling or walls. Does the link in question meet the anticipated plan? For example, in the case of an airline hanger or warehouse, a remote station may be forced to be over 100 meters from the wiring closet. If this has been planned for, and the intended application supports the excess length, then the link may fail structured wiring standards but still be approved for the application. Some field testers allow customized autotests to be configured that permit variances from standard TIA and ISO/CENELEC requirements. Such autotests are useful because they verify the installation meets requirements while allowing for planned variances.

Propagation Delay

Propagation delay, or delay, is a measure of the time required for a signal to propagate from one end of the circuit to the other. Delay is measured in nanoseconds (nS). Typical delay for category 5e UTP is a bit less than 5 nS per meter (worst case allowed is 5.7 nS/m). A 100 meter cable might have delay as shown below.



Delay is the principle reason for a length limitation in LAN cabling. In many networking applications, such as those employing CSMA/CD, there is a maximum delay that can be supported without losing control of communications.

Nominal Velocity of Propagation (NVP) on the other hand, is different. NVP refers to the inherent speed of signal travel relative to the speed of light in a vacuum (designated as a lower case c). NVP is expressed as a percentage of c , for example, 72%, or $0.72c$. All structured wiring cables will have NVP values in the range of $0.6c$ to $0.9c$.

Results Interpretation

Delay measurements are relatively straightforward. Most structured wiring standards expect a maximum horizontal delay of 570 nS. If design specifications allow, higher delay can be acceptable.

Since each pair in the cable has its own unique twist ratio, the delay will vary in each pair. This variance (delay skew, discussed in the next section) should not exceed 50 nS on any link segment up to 100 meters. Standards require all pairs to meet the requirement. It is possible to report just the worst case pair. This will be the pair with the highest propagation delay.

Troubleshooting Recommendations

Excessive propagation delay can have only one cause: the cable is too long. If you fail propagation delay, check to ensure that the pass/fail criteria match the design specifications. If so, the cable is too long. In many cases, a cable up to 25% too long (125m for Category 5) will still support most LAN applications. However, the installation will fail most structured wiring standards, such as those published by CENELEC, ISO/IEC, and the TIA. In some cases, if the customer insists on the location of the terminal equipment, and an excessive length cannot be avoided, you can verify other cable parameters. If they pass, you can provide information that indicates the cable meets frequency-dependent parameters but is non-compliant with overall standards due to excessive length. This provides professional results to the user while placing on them the responsibility for non-compliant cabling.

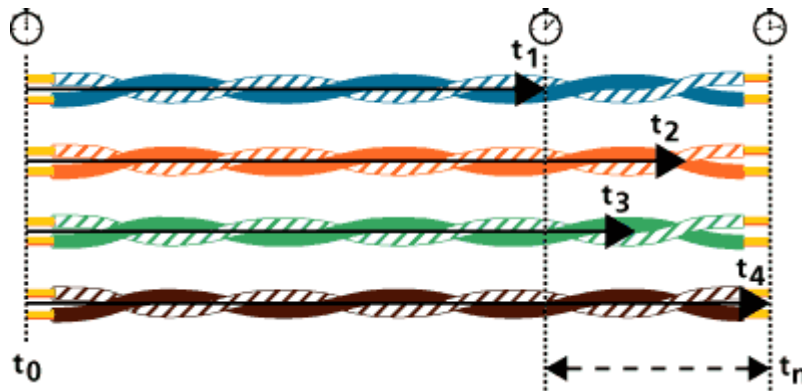
Propagation Delay Skew

Propagation Delay Skew (skew) is the difference between the propagation delay on the fastest and slowest pairs in a UTP cable. Some cable construction employ different types of insulation materials on different pairs. This effect contributes to unique twist ratios per pair and to skew.

Skew is important because several high-speed networking technologies, notably Gigabit Ethernet, use all four pairs in the cable. If the delay on one or more pairs is significantly different from any other, then signals sent at the same time from one end of the cable may arrive at significantly different times at the receiver. While receivers are designed to accommodate some slight variations in delay, a large skew will make it impossible to recombine the original signal.

Results Interpretation

Well-constructed and properly installed structured cabling should have a skew less than 50 nanoseconds (nSec) over a 100-meter link. Lower skew is better. Anything under 25 nSec is excellent. Skew between 45 and 50 nanoseconds is marginally acceptable.



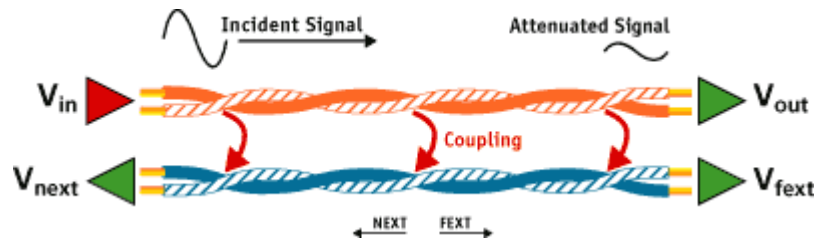
Troubleshooting Recommendations

If the skew is high, provided the intended application is a 2-pair application such as 10Base-T or token ring, the application should still perform. If one pair is much higher or lower in delay than the others, very high skew may result. Examine the delay results for each pair. If one pair exhibits uncharacteristically high or low delay, re-examine the installation.

Attenuation

Recent changes in the standards now use the term "insertion loss" and not attenuation. Given that test equipment manufacturers have used the term attenuation since 1993, attenuation will continue to be seen on test reports.

Electrical signals transmitted by a link lose some of their energy as they travel along the link. Insertion loss measures the amount of energy that is lost as the signal arrives at the receiving end of the cabling link. The insertion loss measurement quantifies the effect of the resistance the cabling link offers to the transmission of the electrical signals.



Insertion loss characteristics of a link change with the frequency of the signal to be transmitted; e.g. higher frequency signals experience much more resistance. Stated a different way, the links show more insertion loss for higher frequency signals. Insertion loss is therefore to be measured over the applicable frequency range. If you test the insertion loss of a Category 5e channel, for instance, the insertion loss needs to be verified for signals ranging from 1 MHz to 100 MHz. For Cat 3 links the frequency range is 1 through 16 MHz. Insertion loss also increases fairly linearly with the length of the link. In other words, if link "A" is twice as long as link "B", and all other characteristics are the same, the insertion loss of link "A" will turn out twice as high as the insertion loss of link "B."

Insertion loss is expressed in decibels or dB. The decibel is a logarithmic expression of the ratio of output power (power of the signal received at the end of the link) divided by input power (the power launched into the cable by the transmitter). The table below demonstrates that the decibel scale is not a linear scale.

Results Interpretation

The attenuation in a cable is largely dependent upon the gauge of wire used in constructing the pairs. 24 gauge wires will have less attenuation than the same length 26 gauge (thinner) wires. Also, stranded cabling will have 20-50% more attenuation than solid copper conductors. Field test equipment will report the worst value of attenuation and margin, where the margin is the difference between the measured attenuation and the maximum attenuation permitted by the standard selected. Hence a margin of 4 dB is better than 1 dB.

Troubleshooting Recommendations

Excessive length is the most common reason for failing attenuation. Fixing links that have failed attenuation normally involves reducing the length of the cabling by removing any slack in the cable run.

Excessive attenuation can also be caused by poorly terminated connectors / plugs. A poor connection can add significant attenuation. Your clue to this cause is to compare the attenuation on the four pairs. If only one or two pairs have high attenuation, this suggests an installation issue. If all pairs have too much attenuation, check for excess length. However, impurities in the copper cable can also cause attenuation failures; again this typically happens on one pair only.

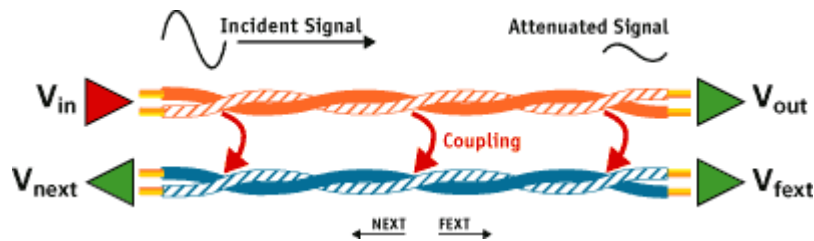
Temperature also affects attenuation in some cables. The dielectric materials, which form the conductor insulation and cable jacket, absorb some of the transmitted signal as it propagates along the wire. This is especially true of cables containing PVC. PVC material contains a chlorine atom which is electrically active and forms dipoles in the insulating materials. These dipoles oscillate in response to the electromagnetic fields surrounding the wires, and the more they vibrate, the more energy is lost from the signal. Temperature increases exacerbate the problem, making it easier for the dipoles to vibrate within the insulation. This results in increasing loss with temperature.

For this reason, standards bodies tend to specify attenuation requirements adjusted for 20°C. Cables operating in temperature extremes can be subject to additional attenuation and where this is likely, the design of the cabling system should take this into consideration. You may not be able to run the maximum 90 meters (295 ft) defined in the standards. Many consultants try and keep runs below 80 meters (262 ft) to provide a safety margin. This of course is not always possible when space is a premium and the number of telecommunications rooms has to be kept to a minimum.

Near End Crosstalk (NEXT)

When a current flows through a wire, an electromagnetic field is created which can interfere with signals on adjacent wires. As frequency increases, this effect becomes stronger. Each pair is twisted because this allows opposing fields in the wire pair to cancel each other. The tighter the twist, the more effective the cancellation and the higher the data rate supported by the cable. Maintaining this twist ratio is the single most important factor for a successful installation.

If wires are not tightly twisted, the result is Near End Crosstalk (NEXT). Most of us have experienced a telephone call where we could hear another conversation faintly in the background. This is crosstalk. In fact, the name crosstalk derives from telephony applications where 'talk' came 'across'. In LANs, NEXT occurs when a strong signal on one pair of wires is picked up by an adjacent pair of wires. NEXT is the portion of the transmitted signal that is electromagnetically coupled back into the received signal.



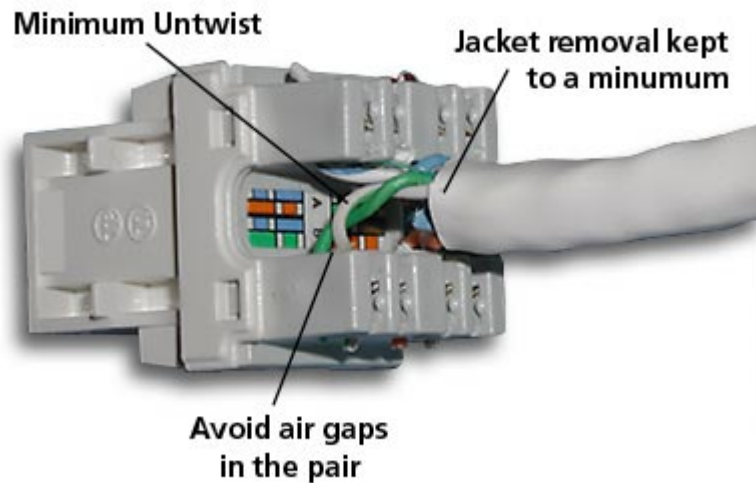
Results Interpretation

Since NEXT is a measure of difference in signal strength between a disturbing pair and a disturbed pair, a larger number (less crosstalk) is more desirable than a smaller number (more crosstalk). Because NEXT varies significantly with frequency, it is important to measure it across a range of frequencies, typically 1 – 100 MHz. If you look at the NEXT on a 50 meter segment of twisted pair cabling, it has a characteristic "roller coaster going uphill" shape. That is, it varies up and down significantly, while generally increasing in magnitude. This is because twisted pair coupling becomes less effective for higher frequencies.

The field tester should compare successive readings across the frequency range against a typical pass/fail line, such as the Class D specification. If the NEXT curve crosses the pass/fail line at any point, then the link does not meet the stated requirement. Since NEXT characteristics are unique to each end of the link, six NEXT results should be obtained at each end.

Troubleshooting Recommendations

In many cases, excessive crosstalk is due to poorly twisted terminations at connection points. All connections should be twisted to within 13 mm of the point of termination according to ANSI/TIA/EIA 568-B. An additional note common to all standards is that the amount of untwist should be kept to a minimum. Experience has shown that 13mm does not guarantee a PASS when field testing.



The first thing to do in the event of a NEXT failure is to use the field tester to determine at which end the NEXT failure occurred. Once this is known, check the connections at that end and replace or re-terminate as appropriate. If this does not appear to be the problem, check for the presence of lower Category patch cords (such as voice grade cable in a Class D installation). Another possible cause of NEXT failures are split pairs. These can be identified automatically with the wiremap function of your field tester. Female couplers are another high source of crosstalk and should not be used in a data installation. If a cable is not long enough, replace it with a cable of the required length rather than adding another cable.

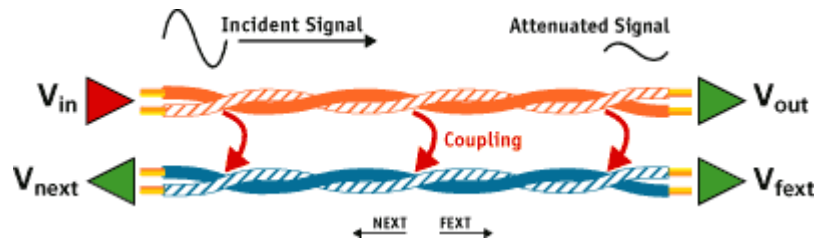
Sometimes a NEXT failure is caused by an inappropriate test being selected. For example, you cannot expect a Category 5 installation to meet Category 5e performance requirements.

The best method for troubleshooting NEXT is to use a tester with Time Domain capabilities. This gives the tester the ability to show the fault by distance, pinpointing the problem. This diagnostic function clearly identifies the cause of the NEXT failure, whether it's the patch cord, connection, or horizontal cable.

In the event you have eliminated all of the above NEXT sources and are still experiencing NEXT failures, contact the system designer for further assistance.

Far End Crosstalk (FEXT)

Far End Crosstalk is similar to Near End Cross Talk (NEXT), except that the signal is sent from the local end and crosstalk is measured at the far end.



Because of attenuation, signals that induce FEXT can be much weaker, especially for longer cable lengths. This effect means that for a given quality of cabling, more FEXT will be seen on a short link than a long link. For reason, FEXT results are not meaningful without an indication of the corresponding attenuation on the link. Thus, FEXT is measured but rarely reported. FEXT results are used to derive Equal Level Far End Crosstalk (ELFEXT).

Attenuation to Crosstalk Ratio (ACR)

Attenuation to Crosstalk Ratio (ACR) is the difference between NEXT and the attenuation for the pair in the link under test. Due to the effects of attenuation, signals are at their weakest at the receiver end of the link. But this is also where NEXT is the strongest. Signals that survive attenuation must not get lost due to the effects of NEXT.

Using PSNEXT and attenuation, Power Sum ACR (PSACR) can also be calculated. PSACR is not required by TIA/EIA 568-B. Some field testers will report it anyway. However, if you desire PSACR you will need to specify it's requirement in the statement of works document.

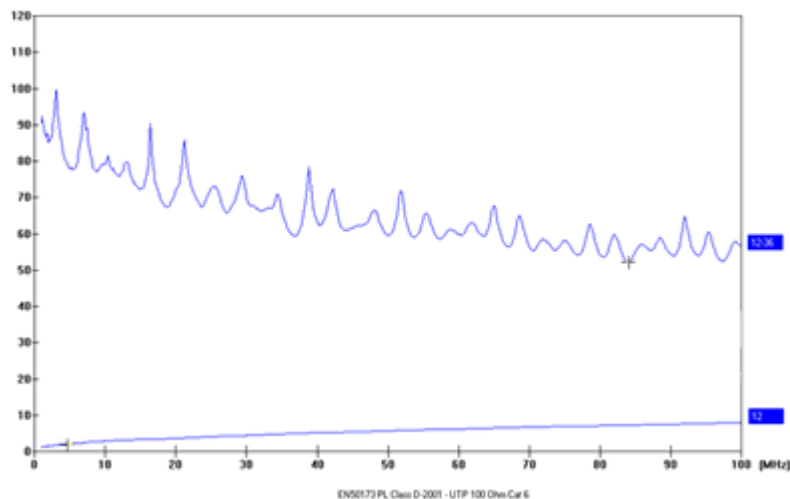
During signal transmission over twisted pair cable, both attenuation and crosstalk are active simultaneously. The combined effect of these two parameters is a very good indicator of the real transmission quality of the link. This combined effect is characterized by the Attenuation-to-Crosstalk Ratio (ACR). ACR is nearly analogous to the definition of signal-to-noise ratio. (ACR excludes the effect of external noise that may impact the signal transmission.)

Results Interpretation

ACR is an important figure of merit for twisted pair links. It provides a measure of how much 'headroom' is available, or how much stronger the signal is than the background noise. Thus, the greater the ACR, the better.

Troubleshooting Recommendations

ACR is derived from NEXT and attenuation data. Any steps taken to improve either NEXT or attenuation performance will improve ACR performance. In practice, this usually means troubleshooting for NEXT because the only way to significantly improve attenuation is to shorten the length of the cable.



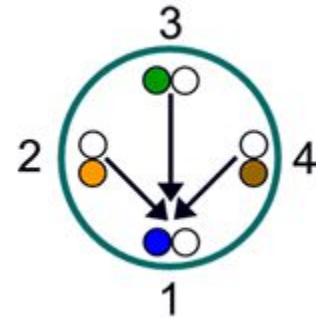
Top Line is next, Bottom is Attenuation, ACR is the difference.

Power Sum NEXT (PSNEXT)

Power Sum NEXT (PSNEXT) is a calculation, not a measurement. PSNEXT is derived from the summation of the individual NEXT effects on each pair by the other three pairs. PSNEXT is important measurements for qualifying cabling intended to support 4 pair transmission schemes such as Gigabit Ethernet, although IEE 8023.ab does not specifically require PSNEXT. If you run the specific Gigabit Ethernet test within the field tester, you will see that PSNEXT is not recorded. There are four PSNEXT results at each end of the link per link tested.

Results Interpretation

Since PSNEXT is a measure of difference in signal strength between disturbing pairs and a disturbed pair, a larger number (less crosstalk) is more desirable than a smaller number (more crosstalk). Because PSNEXT varies significantly with frequency, it is important to measure it across a range of frequencies, typically 1 – 100 MHz. If you look at the PSNEXT on a 50 meter segment of twisted pair cabling, it has a characteristic "roller coaster" shape. That is, it varies up and down significantly, while generally increasing in magnitude. This is because twisted pair coupling becomes less effective for higher frequencies. Typically, PSNEXT results are around 3 dB lower than the worst-case NEXT result at each end of the link.



Troubleshooting Recommendations

Since PSNEXT is a calculation based on NEXT measurements, troubleshooting for PSNEXT failures reduces to troubleshooting for NEXT problems. Once you have isolated and repaired the NEXT problem, PSNEXT will automatically improve. Troubleshooting NEXT requires a field tester with the ability to look down the cable and see where the crosstalk is happening.

Power Sum Attenuation to Crosstalk Ratio (PSACR)

Power Sum Attenuation to Crosstalk Ratio (PSACR) is actually a calculation, not a measurement. PSACR is derived from an algebraic summation of the individual ACR effects. There are four PSACR results at each end of the link per link tested.

Results Interpretation

Since PSACR is a measure signal to noise ratio, a larger number (more signal and less noise) is more desirable than a smaller number (more noise and less signal). Typically PSACR results are around 3 dB lower than the worst-case ACR result at each end of the link.

Troubleshooting Recommendations

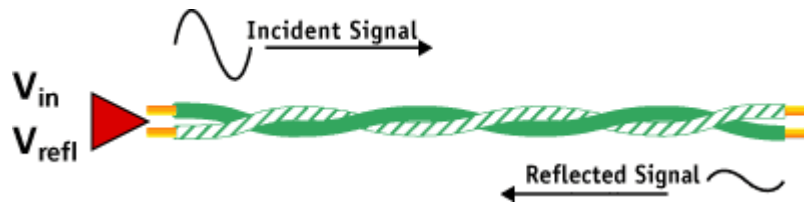
Since PSACR is a calculation based on ACR measurements, troubleshooting for PSACR failures is really troubleshooting for ACR problems. As mentioned earlier, troubleshooting for ACR becomes troubleshooting for NEXT and attenuation. Once you have isolated and repaired the ACR problem, the PSACR will automatically improve.

Return Loss

The impact of incorrect characteristic impedance is more accurately measured and represented by the quantity return loss.

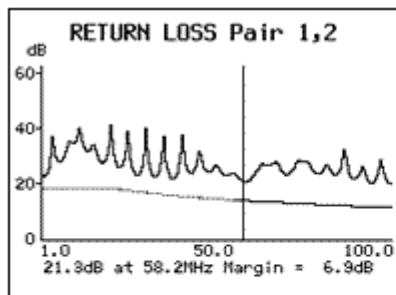
Return Loss (RL) is a measure of all reflections that are caused by the impedance mismatches at all locations along the link and is expressed in decibel (dB). Return Loss is of particular concern in the implementation of Gigabit Ethernet.

The value of impedances at the ends of the link must be equal to the characteristic impedance of the link. Frequently, this impedance is imbedded in the interface of equipment to be connected to the LAN. A good match between characteristic impedance and termination resistance in the equipment provides for a good transfer of power to and from the link and minimizes reflections. The return loss measurement varies significantly with frequency. One source of return loss is due to (small) variations in the value of the characteristic impedance along the cable. The property Structural Return Loss (SRL) summarizes the uniformity in cable construction. SRL is to be measured and controlled during the cable manufacturing process. Another source is caused by reflections from inside the installed link, mainly from connectors. The characteristic impedance of links tends to vary from higher values at low frequencies to lower values at the higher frequencies.

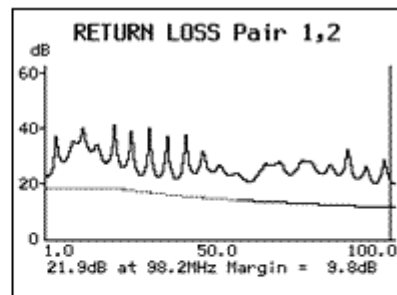


Results Interpretation

All standards define the formulae to calculate the allowable return loss for each cabling link model (Channel and Permanent Link) over the frequency range. A field test instrument may report a passing return loss test result in one of two ways: (1) the worst case return loss margin or (2) the worst case return loss value.



This is worst case margin.
The closest point to the limit line happens at 58.2MHz.



This is worst case. The worst value of return loss happens at 98.2MHz.

Equal Level Far End Crosstalk (ELFEXT)

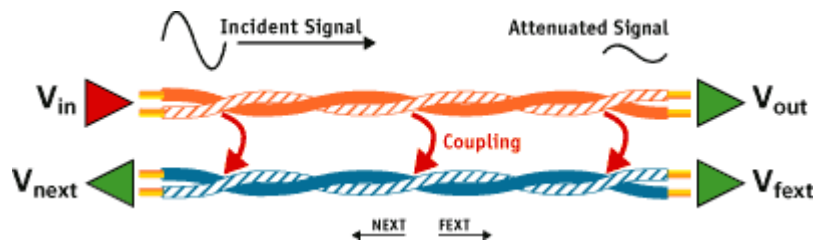
ELFEXT is a calculated result, rather than a measurement. It is derived by subtracting the attenuation of the disturbing pair from the Far End Crosstalk (FEXT) this pair induces in an adjacent pair. This normalizes the results for length. Consider the FEXT and attenuation measured on two links constructed of the same materials with the same workmanship, but different lengths.

50 m link example:

FEXT = 45 dB and Attenuation = 11 dB

ELFEXT = 45 - 11 = 34 dB

Another way to understand ELFEXT is to think of far-end Attenuation Crosstalk Ratio (ACR) as the same thing.



Results Interpretation

Compare the results of measurements made from both ends of the link to the appropriate ISO or TIA limits. There are 12 ELFEXT measurements made from each end, for a total of 24. This is because the attenuation can vary slightly depending upon which pair is energized. So as an example, the field tester will energize Pair 1 and listen on Pair 2 at the far end. Then it will energize Pair 2 and listen on Pair 1 at the far end.

ELFEXT that is too high is indicative of either excessive attenuation, higher than expected FEXT, or both.

Troubleshooting Recommendations

The same factors that contribute to NEXT problems contribute to FEXT problems. Troubleshooting for ELFEXT means troubleshooting NEXT and attenuation problems, just as you would for ACR problems.

Power Sum Equal Level Crosstalk (PSELFEXT)

Power Sum ELFEXT (PSELFEXT) is actually a calculation, not a measurement. PSELFEXT is derived from an algebraic summation of the individual ELFEXT effects on each pair by the other three pairs. There are four PSELFEXT results for each end.

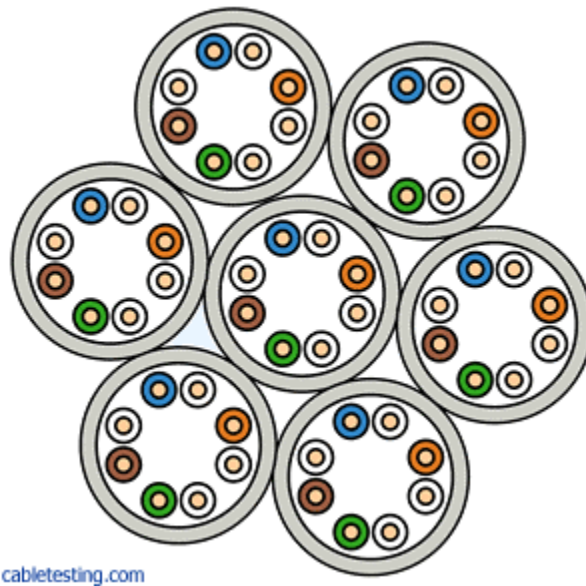
Results Interpretation

Typically PSELFEXT results are around 3 dB lower than the worst-case ELFEXT result at each end of the link.

Alien Crosstalk

When cables are adjacent to each other, emissions from one cable can affect pairs in the other cables. This effect is called Alien Crosstalk. For UTP cables that are closely bundled together for a distance of more than 15 meters, Alien Crosstalk can be a concern. Alien Crosstalk, unlike NEXT, is an unpredictable noise source. Measurement of alien crosstalk is difficult because it requires synchronizing two sets of test instruments, and it is a lab measurement only. There are no pass/fail limits proposed or set.

The animation below helps illustrate this potential problem.



Insertion Loss Deviation

Impedance uniformity is an increasingly important parameter to understand, measure, and quantify for high speed full duplex transmission systems. The most common way to specify cable roughness or impedance uniformity has been to measure return loss. Since return loss is a reflection measurement, the amount of impedance variation measured becomes restricted at high frequencies to the first few meters of cabling. There is an interest in looking at the degree of impedance uniformity over an entire 100 meter segment in such a way as the high frequency components or roughness are not masked or attenuated by distance.

One way to accomplish these objectives is to make a through measurement rather than a reflection measurement. When insertion loss is measured on links exhibiting structural impedance variations, a ripple occurs in the insertion loss results at high frequencies (typically above 75 MHz). This ripple increases in magnitude as a function of frequency and the amount of structure in the cable. Insertion loss deviation is a measure of the worst case difference in magnitude between the expected insertion loss and the actual measured insertion loss. Insertion loss deviation is measured by first finding the insertion loss, and then computing the maximum amplitude across the specified frequency range between the insertion loss and the least squares curve that fits the insertion loss data.

The term "insertion loss" is used instead of attenuation because attenuation assumes matching impedance between the system under test and the test device. For insertion loss measurements the test device is set at 100 ohms and the system under test may have an input impedance between 85 and 115 ohms.

Experiments show that return loss is not necessarily correlated to insertion loss deviation.

Results Interpretation

While insertion loss deviation is under study as a Category 6 link test, there are as yet no pass/fail limits set. All that can be said is the minimum possible insertion loss is desirable.

As an illustration of insertion loss deviation, two Category 5 cables and one Category 6 cable were tested with a network analyzer. Attenuation and return loss were measured, then insertion loss deviation computed. All three results were plotted on the same graph to 300 MHz.

Category 5 cable C shows a correspondence between an insertion loss minima at 112 MHz and a return loss maxima. The worst case insertion loss deviation on cable C was slightly less than 2 dB. The worst case insertion loss deviation on cable B was much worse, at 8 dB, yet cable B showed better return loss performance. This suggests some structure effects are only evident at higher frequencies. Because return loss is a reflection measurement, much of these high frequency effects are not seen if they are more than a few meters from the measurement port (due to attenuation effects).

DC Loop Resistance

DC Loop Resistance is the total resistance through two conductors looped at one end of the link. This is usually a function of the conductor diameter and varies only with distance. This measurement is sometimes done to ensure there are no gross misconnections which can add significant resistance to the link. Note that the wire map test automatically isolates breaks but not high resistance connections.

DC resistance is often confused with impedance, a term describing the dynamic resistance to signal flow, usually at a specified frequency. Both are measured in ohms because they define different types of opposition to electrical current flow. DC resistance increases proportionately with the length of the cable tested while impedance remains "fairly" constant regardless of length.

From a signal perspective, attenuation (sometimes called *insertion loss*) is now a more useful measurement, and DC resistance has become less important.

Results Interpretation

Variations in loop resistance between pairs can often be a quick indication of a cabling problem. In a shorted loopback test environment, the expected value is simply twice the sum of the value expected for the given length. This is a simple test for any advanced field tester.

Troubleshooting Recommendations

In the case of unexpected high DC resistance, compare the failed pair against other pairs in the cable. This will determine whether the issue is specific to the one failed pair or due to a problem affecting the entire cable. If a single pair is at fault, inspect termination points for a poorly made or oxidized connection.

If all four pairs have unexpected high DC resistance, check your assumptions. Did you allow for double the resistance to include the loopback? Is the resistance assumption correct for the gauge of wire used? 26 gauge has higher resistance per foot than 24 gauge. Do you have an unusual patch cord in the link that could have high resistance? Look for anything unusual especially if adjacent cables appear to be normal.