

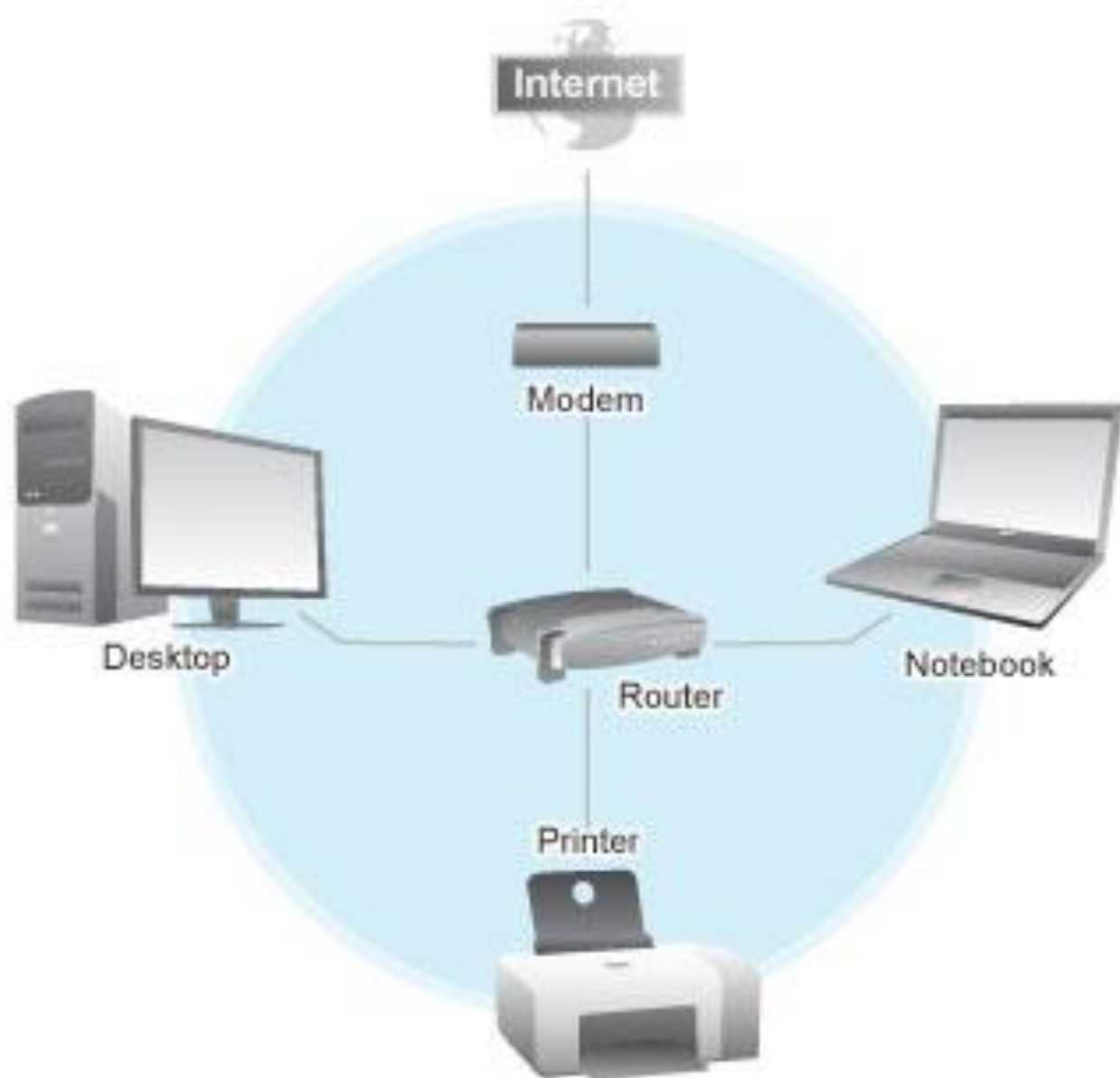


A számítógépes hálózatok Computer networks Počítačové siete

A hálózati átviteli közegek

Prenosové médiá

Connection environment



A Typical Wired Network

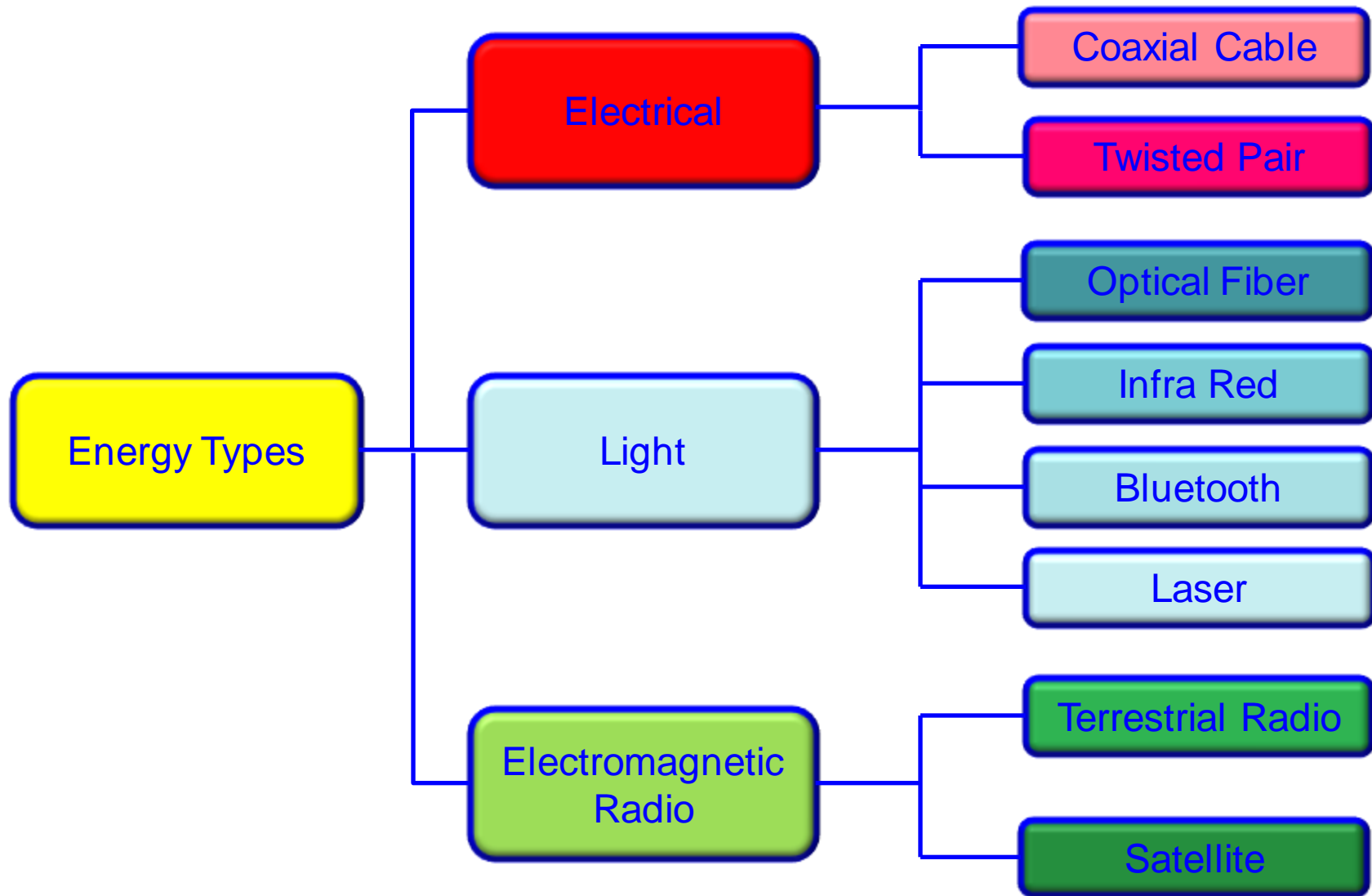
Wireless Networking



Podľa použitého prenosového média

Az átviteli közeg alapján

- **Metallická sieť – fémvezetékes hálózat**
- **Telefónna sieť – telefon hálózat**
- **Elektrická sieť – elektromos hálózat**
- **Optická sieť – optikai hálózat**
- **Bezdrôtová sieť – vezeték nélküli hálózat**



Hálózati átviteli közegek típusai



Koaxiális kábel



Fénykábel



Árnyékolatlan csavart érpár

Hálózati átviteli
közegek típusai.

Coax Cable

- These cables are widely used for cable -TV systems, offices and in past other workplaces for LANs. Cable consists of copper or aluminum wire wrapped with an insulating layer is generally a flexible material with a high dielectric constant, which are all surrounded by a conductive layer. Layers of insulation help minimize interference and distortion. Transmission speeds range from 200 Mbps to more than 500 Mbps.

Twisted-Pair Wire

- This is the most used medium for telecommunications and LANs. Twisted pair cables are standard telephone cables, which consist of two insulated copper wires twisted in pairs and are used to perform voice, and data transmission. Using two wires to help crosstalk and electromagnetic induction to reduce. The size of the transmission rate of 2 Mbps to 100 Mbps.

Fiber Optics

- These cables consist of one or more thin filaments of glass encased in a protective layer. They emitted light that can travel long distances and higher speeds. Fiber-optic cables are not affected by electromagnetic radiation. Higher transmission speeds can reach one billion bits per second. The speed of fiber is of hundreds times faster than the coaxial cable and a thousand times faster than twisted pair.

Metalická sieť 1

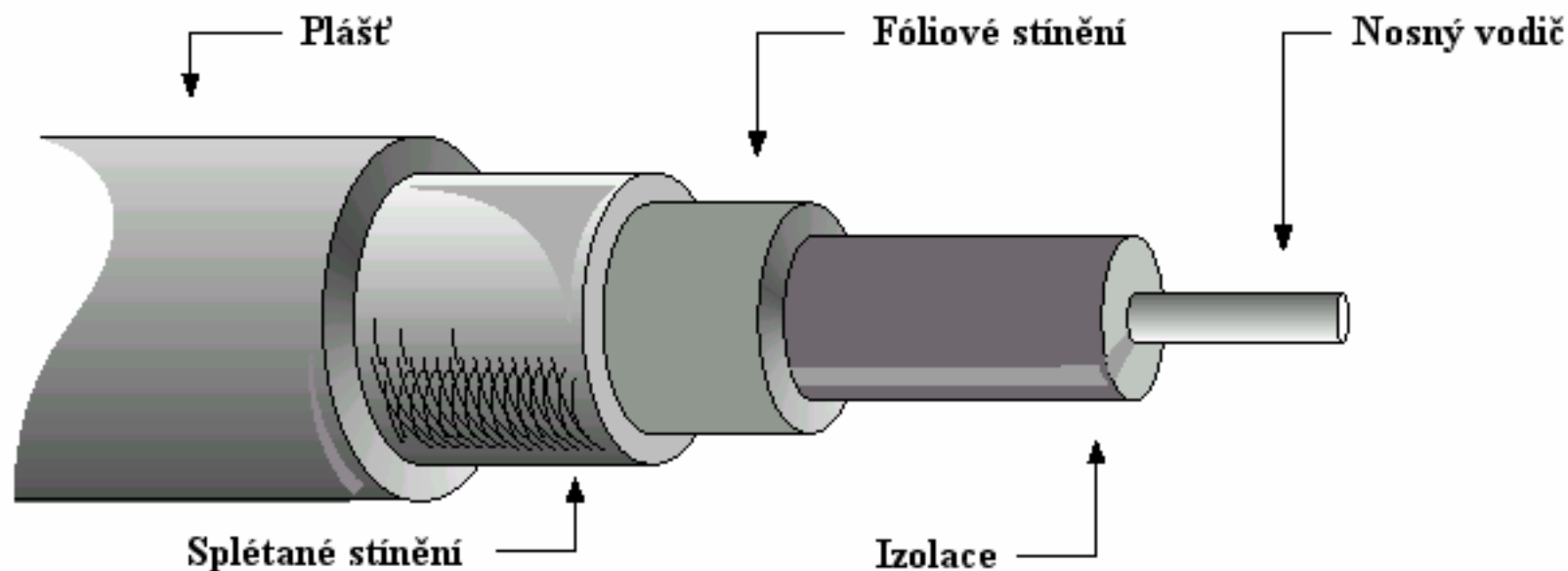
Koaxiálny kábel

- dnes sa pre prenos dát používa zriedka; koaxiálny kábel sa však používa aj v káblovej televízii a umožňuje využiť ho aj na pripojenie do siete; je nutné použiť modem, ktorý „odfiltruje sieťový signál“

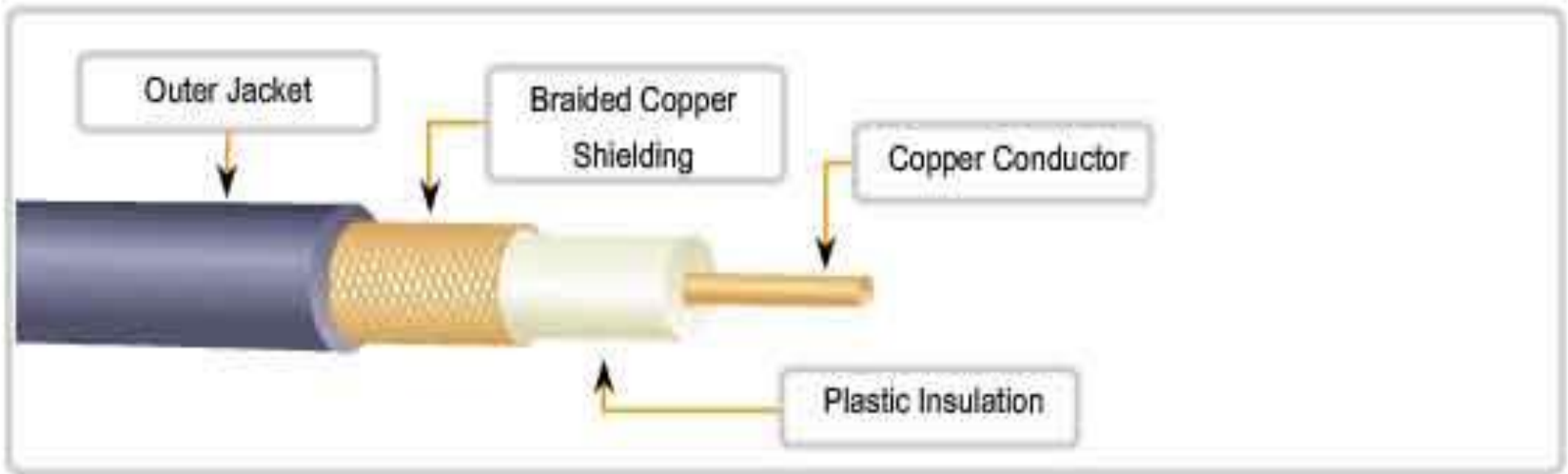
Koaxiális kábel

Középen tömör rézhuzal, ezt egy szigetelő réteg veszi körül, erre egy árnyékoló fémréteg jön, majd egy újabb szigetelő. Jellemzője a ellenállása. Szabványos értékek: 50, 75, 93 Ohm. Lehet alapsávú és szélessávú átvitelre is használni. T csatlakozót (vékony koax) vagy un. vámpír csatlakozót (vastag koax) alkalmaznak a számítógép csatlakozásánál. Előnye a nagy sáv szélesség, nagy távolság, zajérzékeltlenség. Viszont lehallgatható, rendkívül sérülékeny és nehézkesen szerelhető.

Koaxiální kábel

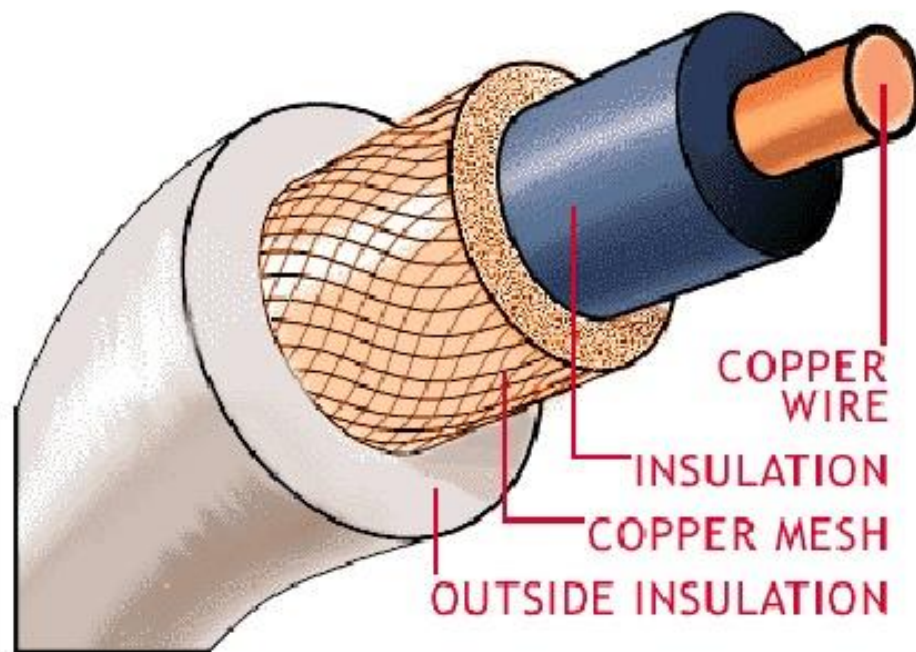


Coaxial Cable Design

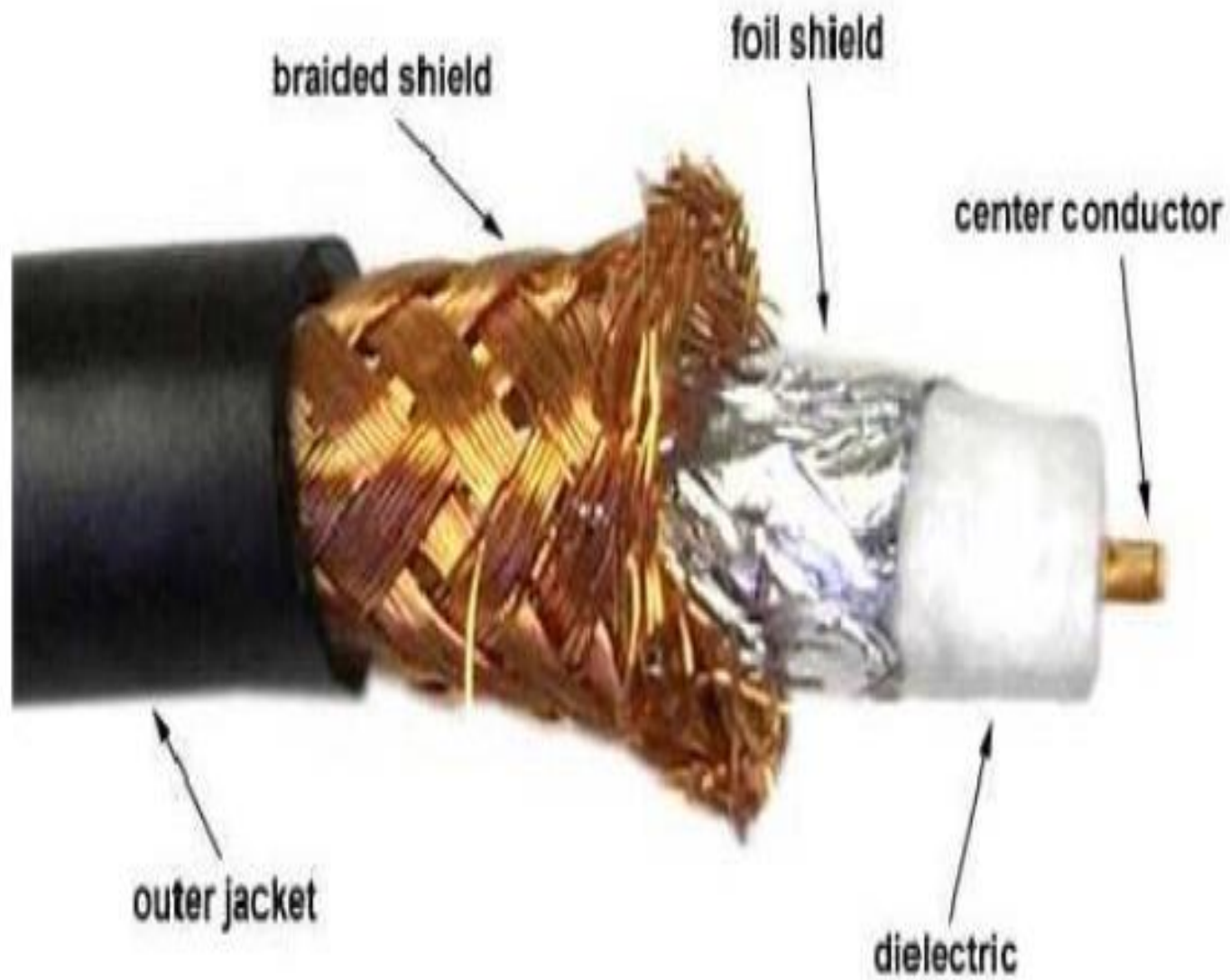


Coaxial Connectors





COAXIAL CABLE



Koaxiálny kábel

Podľa hrúbky môžeme koaxiálne káble rozdeliť na:

– **hrubý** (thick):

hrubý Ethernet kábel, "thicknet",
10base5,... priemer $\varnothing = 3/8"$
(cca. 1cm)



– **tenký** (thin):

tenký Ethernet kábel, "thinnet",
"cheapernet", 10base2,...
priemer $\varnothing = 3/16"$ (cca. 0,5cm)

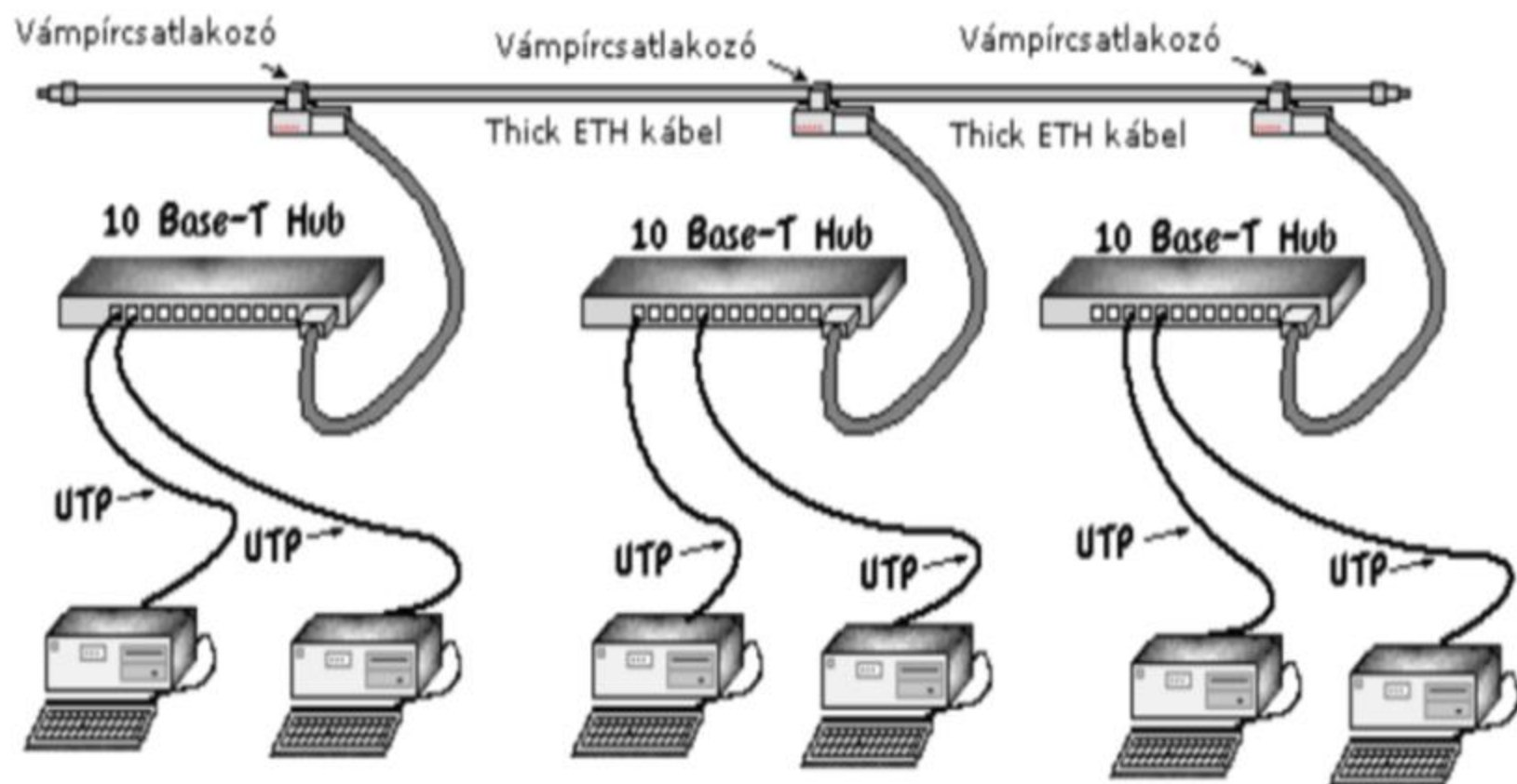


Vastag koax (10BASE5) és a vámpírcsatlakozó



A vámpír csatlakozó (vampire clip)

A vastag kábeleknél a számítógép-csatlakoztatás módja az ún. vámpír csatlakozó használata. Az ilyen rendszerű csatlakozás kialakítási módja a következő: a kábelbe egy rendkívül pontos mélységű és szélességű lyukat fúrnak. A lyuknak a rézmagban kell végződnie. Ebbe a lyukba kell becsavarni egy speciális csatlakozót (ez a vámpír csatlakozó) , amelynek végül is ugyanaz a célja mint a T csatlakozónak, csak nem kell elvágni a kábelt. A vámpír csatlakozókat csak a kábel jelölt, meghatározott pontjain lehet elhelyezni.



Koaxiális kábel



Koaxiálny kábel

Výhody koaxiálneho káblu:

- veľká odolnosť proti EMI
- prijateľná cena (tenký koax. kábel)
- môže slúžiť i k prenosu hlasu a videa

Nevýhody koaxiálneho káblu:

- zložitá inštalácia (hrubý koax. kábel)
- nízke prenosové rýchlosti (rádovo Mbps)

Koaxiálny kábel

Niektoré typy koaxiálnych káblov:

- RG-6: $Z_0 = 75 \Omega$, používa sa ako pomocný kábel pre CATV i TV
- RG-8: $Z_0 = 50 \Omega$, používal sa pre hrubý (thick) Ethernet
- RG-11: $Z_0 = 75 \Omega$, používa sa pre hlavné rozvody CATV i TV
- RG-58: $Z_0 = 50 \Omega$, používal sa pre tenký (thin) Ethernet
- RG-59: $Z_0 = 93 \Omega$, používal sa pre ARCnet
- RG-62: $Z_0 = 93 \Omega$, používal sa pre ARCnet a zapojenia terminálov v IBM SNA sieťach

Metalická sieť 2

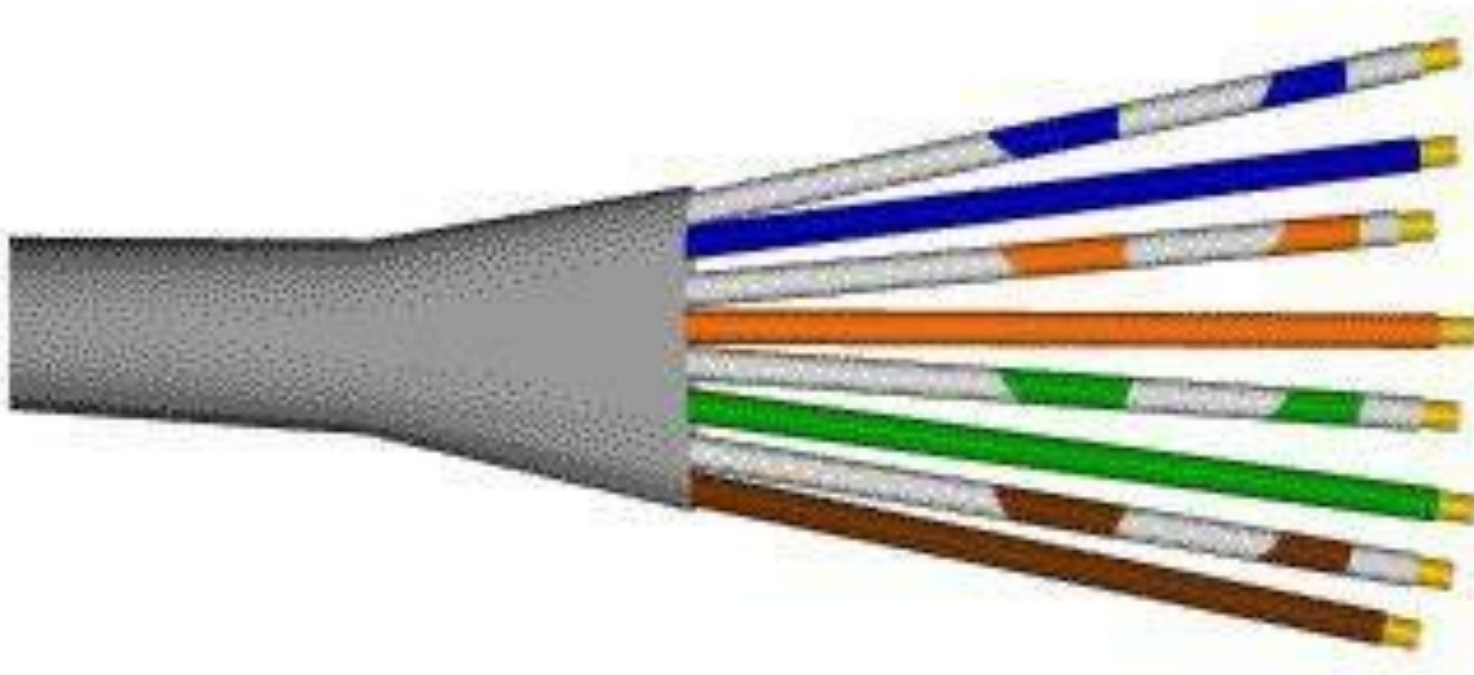
Krútená dvojlinka (Twisted pair - TP)

- štandardne ide o štvorpárový kábel, pričom vodiče páru sú navzájom prepletené, skrútenie pomáha redukovať vzájomné presluchy a šumy z vonkajšieho prostredia a zároveň bráni vyžarovaniu z páru do prostredia (EMI) a straty spôsobené kapacitným odporom, tj. tendenciou nevodiča uchovávať elektrický náboj)
- rozdiel potenciálov v páre kóduje prenášaný signál;

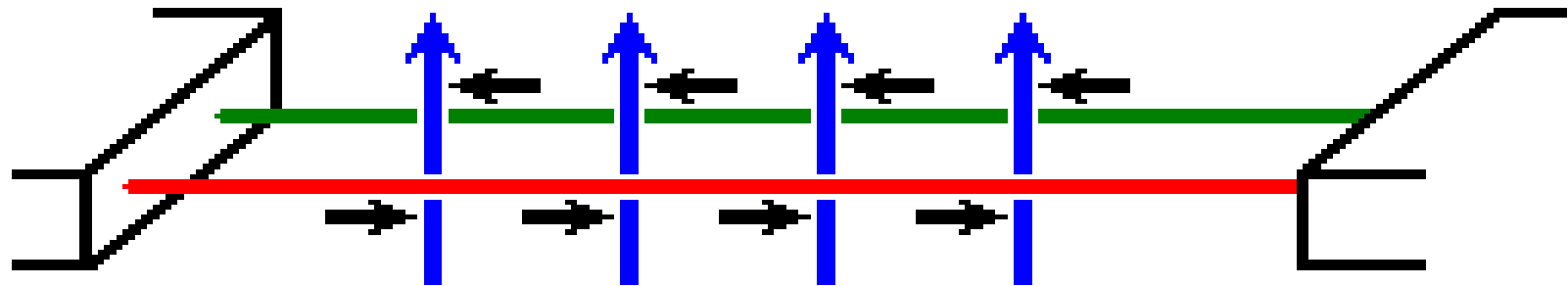
Sodrott (csavart) érpár

- Két szigetelt, egymással összecsavart rézhuzalból áll. Lehet árnyékolatlan (**UTP**, Unshielded Twisted Pair) illetve árnyékolt (**STP**, Shielded Twisted Pair) felépítésű. Könnyen szerelhető, strukturált, egyszerűen bővíthető. Zajérzékeny, limitált a sávszélessége, valamint lehallgatható.

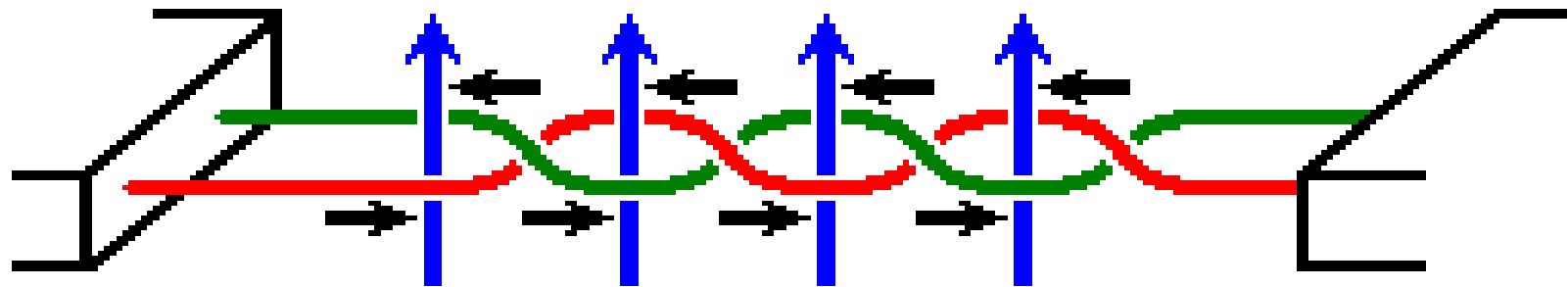
Krútená dvojlinka / Twisted pair – TP / Csavart érpár



Noise in straight and twisted pair cables



Straight cable



Twisted pair cable



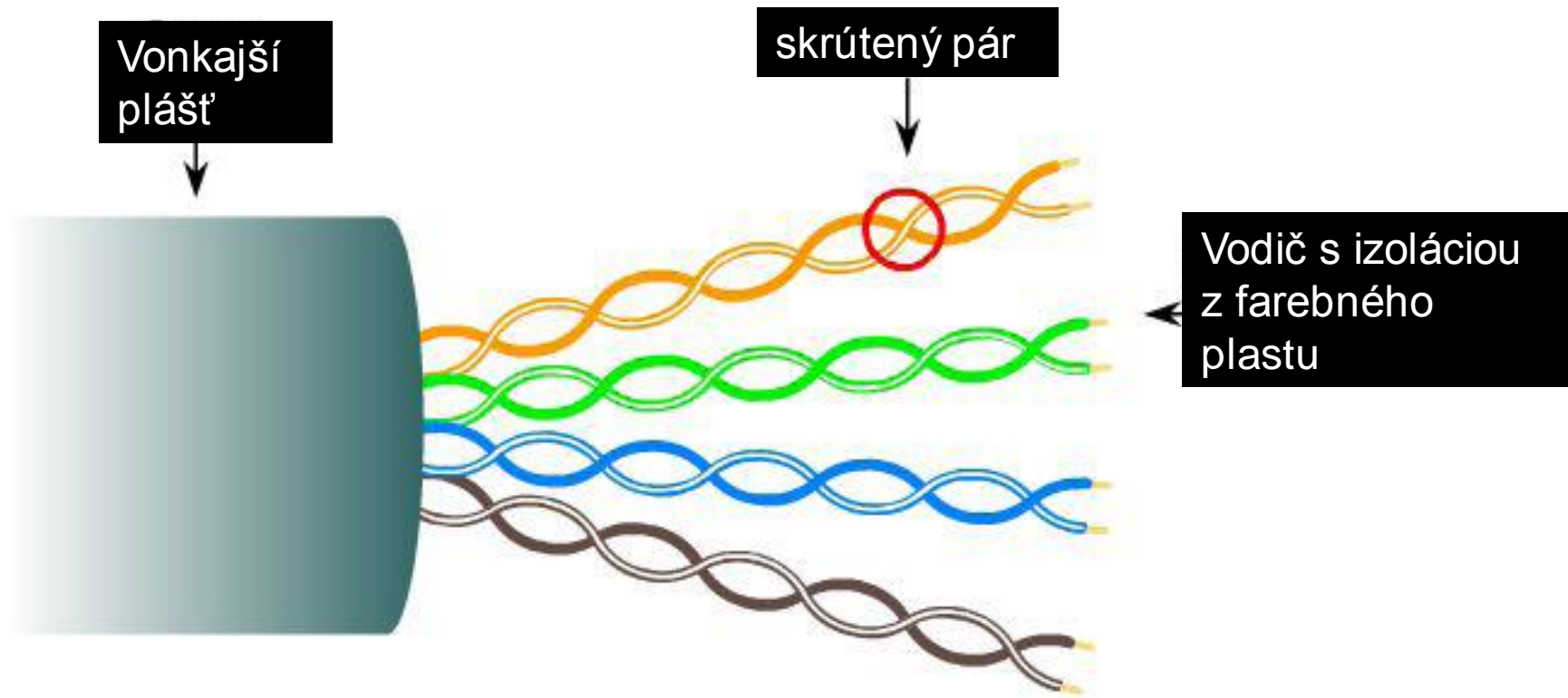
Magnetic field

Induced noise current

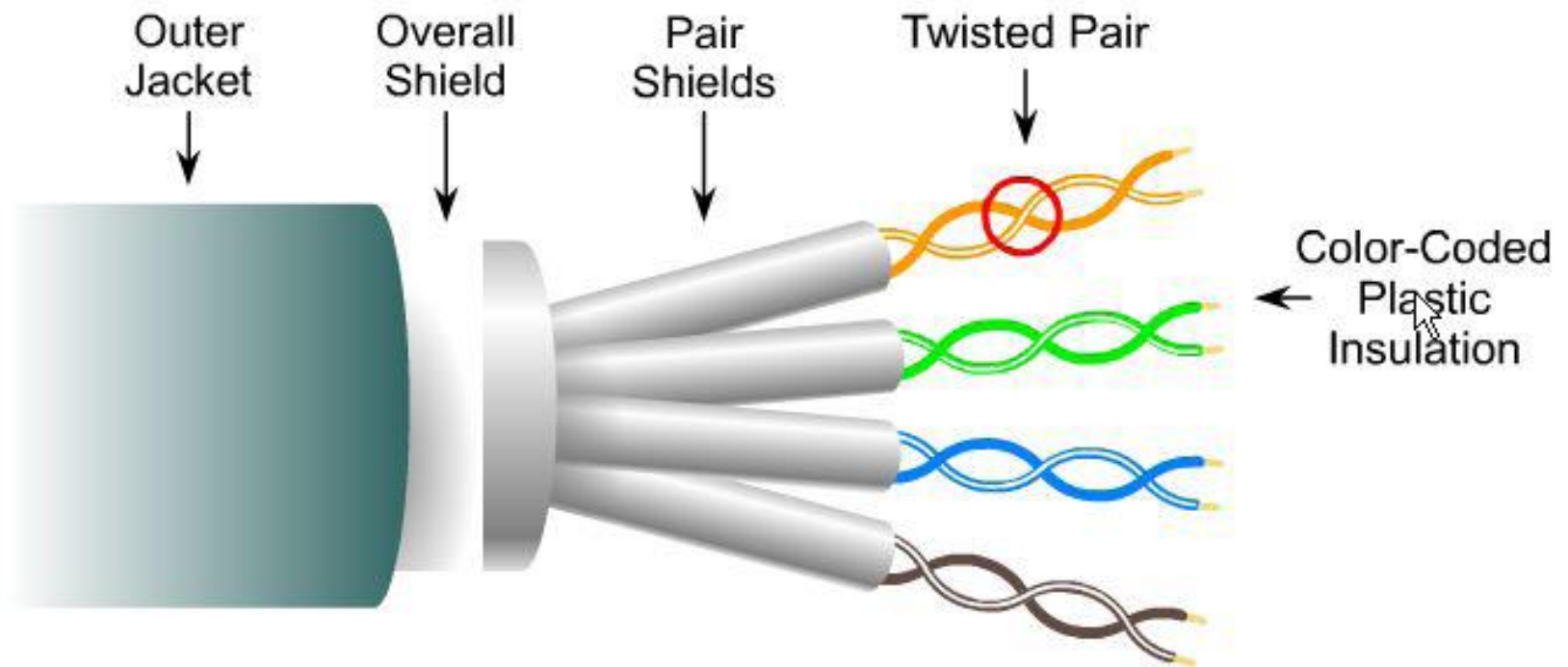
Metalická sieť 3

- **UTP** (Unshielded Twisted Pair – netienená krútená dvojlinka); Ethernet 10Base-T, 100Base-TX 100Base-T2 používajú iba 2 zakrútené páry (4 vodiče), 100Base-T4 a 1000Base-T vyžaduje všetky 4 páry
- **FTP** (Foiled Twisted Pair – fóliovaná krútená dvojlinka) – ako UTP, ale obtočená hliníkovou fóliou na zníženie vyžarovania
- **STP** (Shielded Twisted Pair – tienená krútená dvojlinka) – dokonalejšie tienenie ako FTP, pretože tienené sú už páry (tienenie môže byť realizované aj opletením neizolovaným zväzkom vodičov)

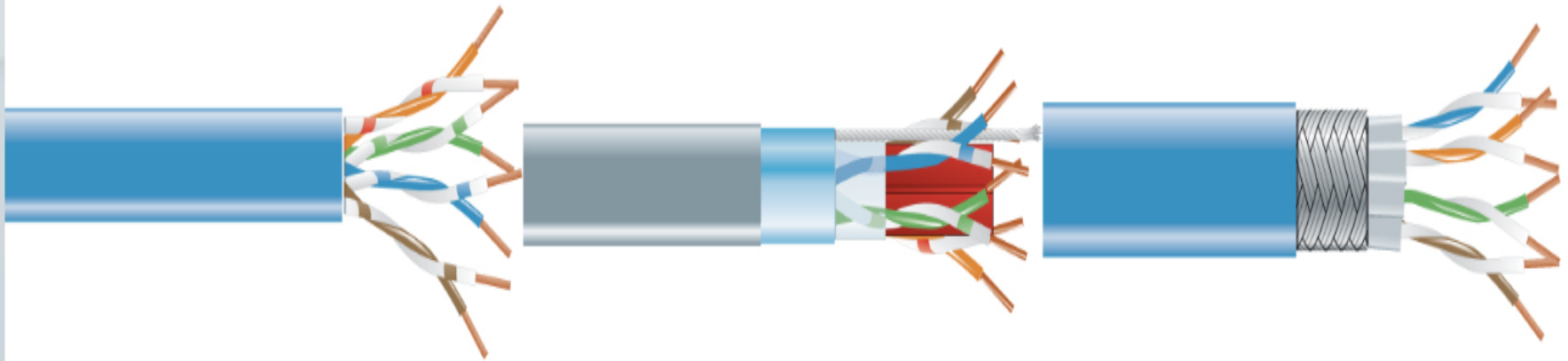
UTP



STP



UTP, F/UTP, S/FTP

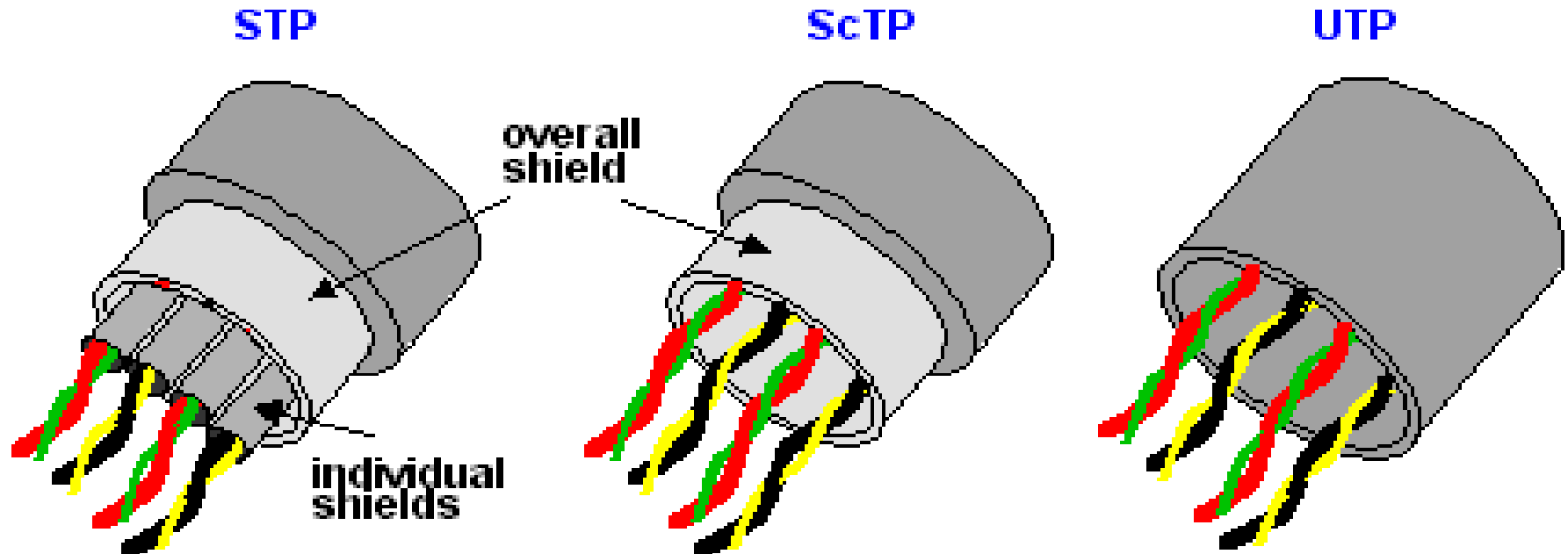


UTP: unshielded twisted pair

F/UTP: foiled/unshielded

twisted pair (An overall foil shield over four unshielded twisted pairs. Shown with rip cord, Mylar® sheath, and pair separator.)

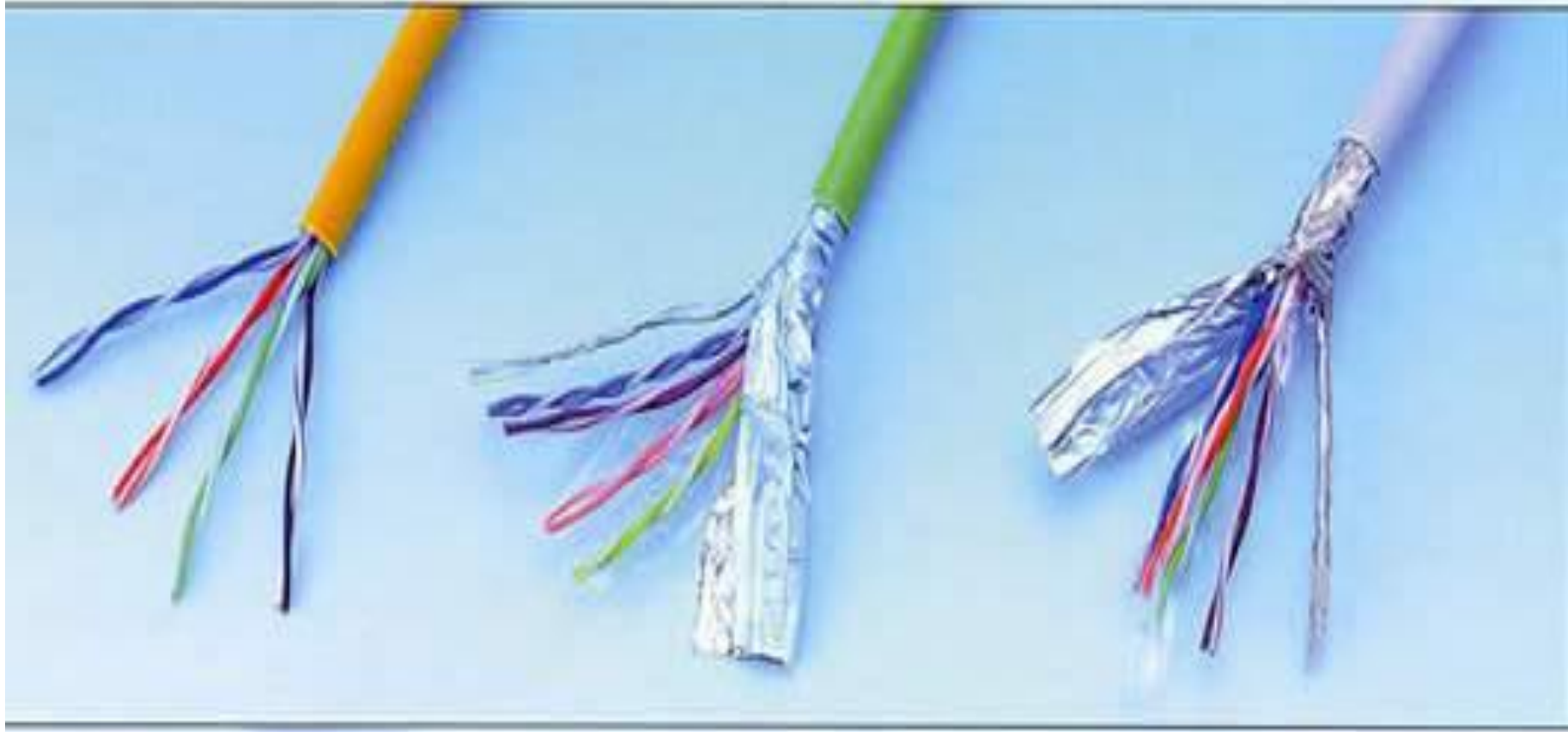
S/FTP: shielded/foiled twisted pair (A braided shield over four individually foil-shielded twisted pairs)



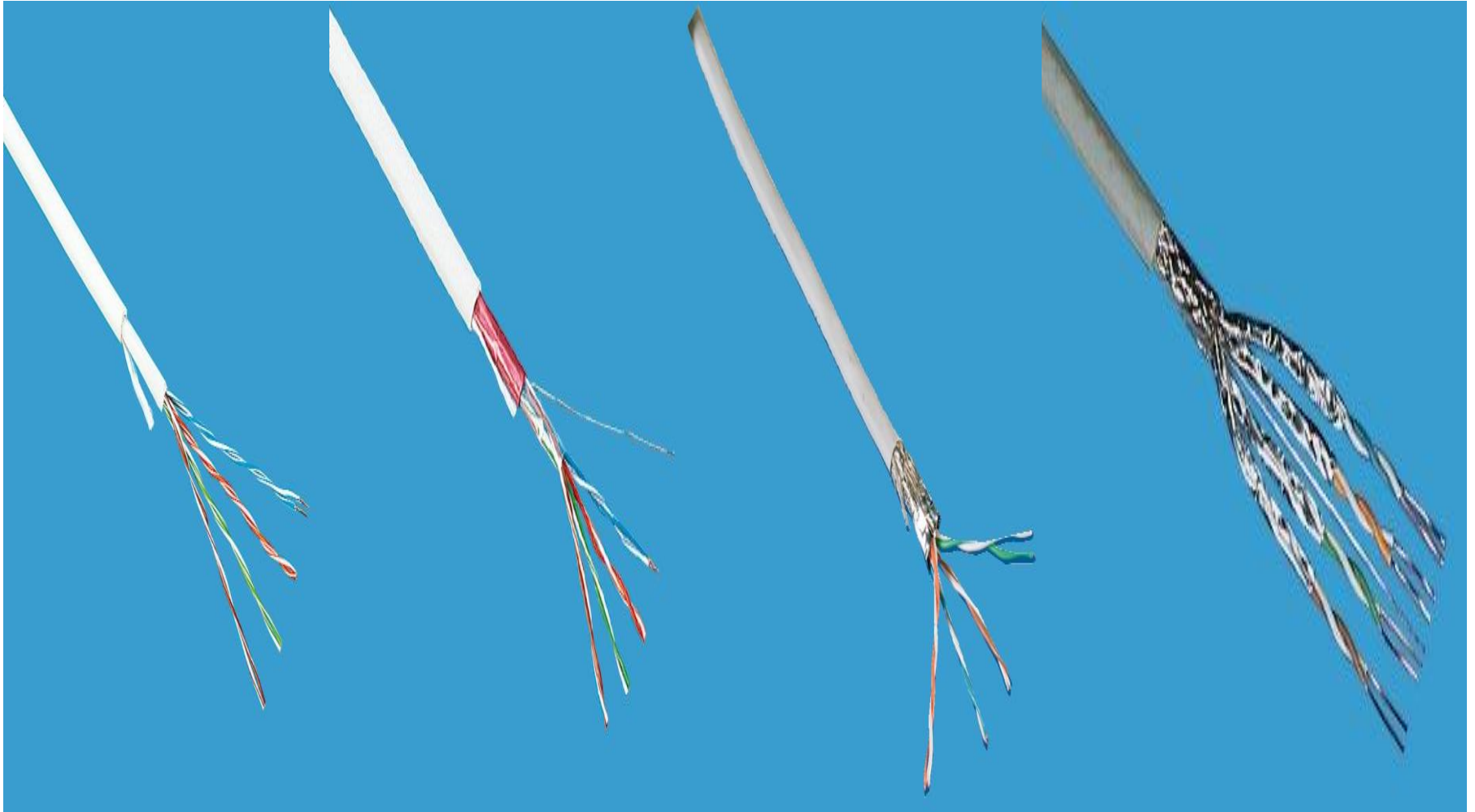
UTP, STP, ScTP, FTP

Twisted pair cables are available unshielded (UTP) or shielded (STP), with UTP being the most common. STP is used in noisy environments where the shield around each of the wire pairs, plus an overall shield, protects against excessive electromagnetic interference. A variation of STP, known as ScTP for "screened twisted pair" or FTP for "foil twisted pair," uses only the overall shield and provides more protection than UTP, but not as much as STP.

Porovnanie TP

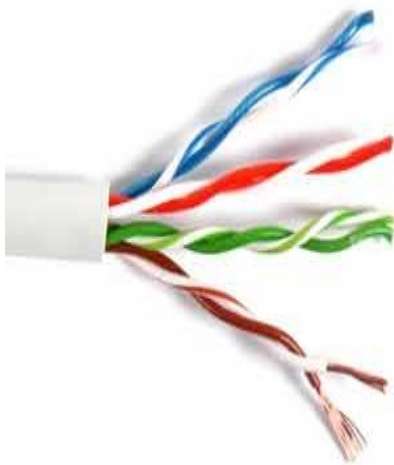


Porovnanie TP

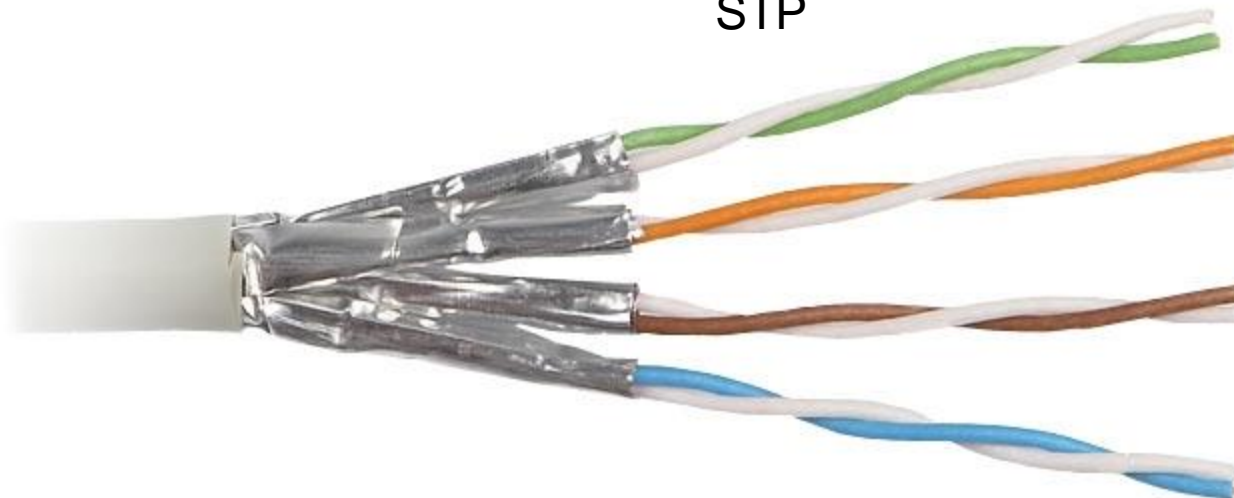


Porovnanie TP

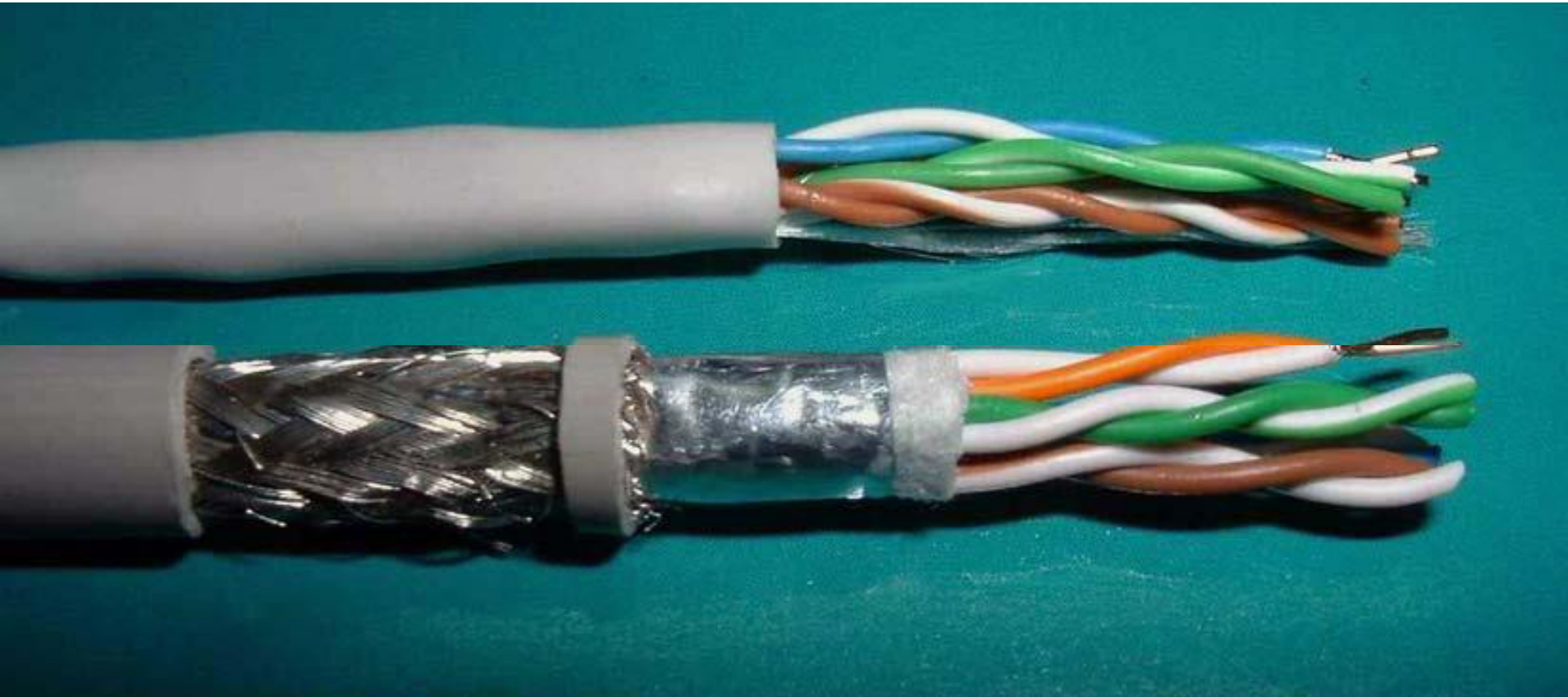
UTP



STP

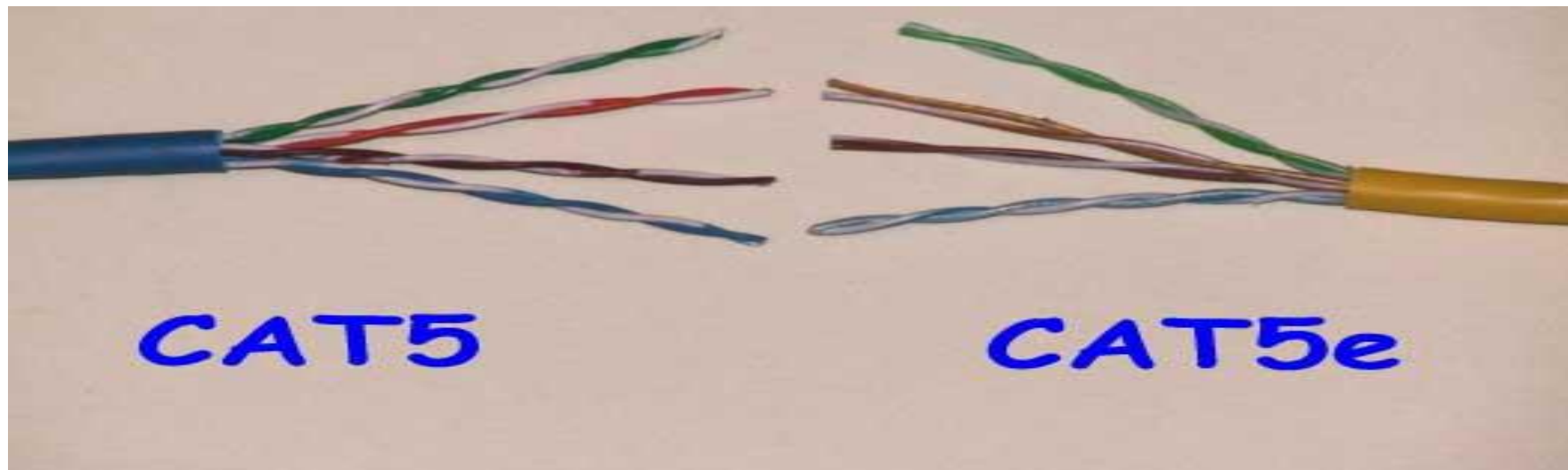


Különböző csavart érpáras kábelek

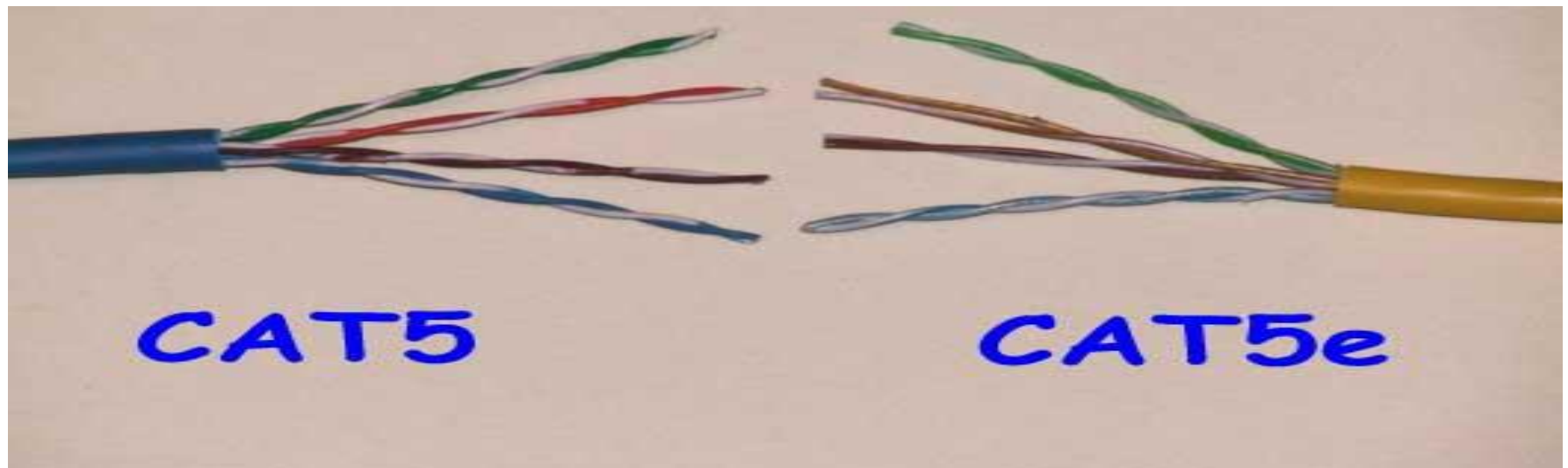


Kategórie káblov TP (UTP)

- **Kategória 1:** klasický telef. kábel schopný prenášať hlas, nie údaje. Pre počítačové siete nemá význam.
- **Kategória 2:** garantuje vlastnosti kábla na prenos do rýchlosti 4 Mbit/s
- **Kategória 3:** základná kat. pre prenos podľa špecifikácie 10Base-T, garantuje do 10 Mbit/s
- **Kategória 4:** prenos do rýchlosti 16 Mbit/s a šírka pásma 20 MHz
- **Kategória 5:** prenos do rýchlosti 100 Mbit/s a šírku pásma 100 Mhz
- **Kategória 5e:** rozšírenie kat. 5, pridaná špec. pre presluch na vzdialenom konci. Prenosové rýchlosti 1 Gbit/s

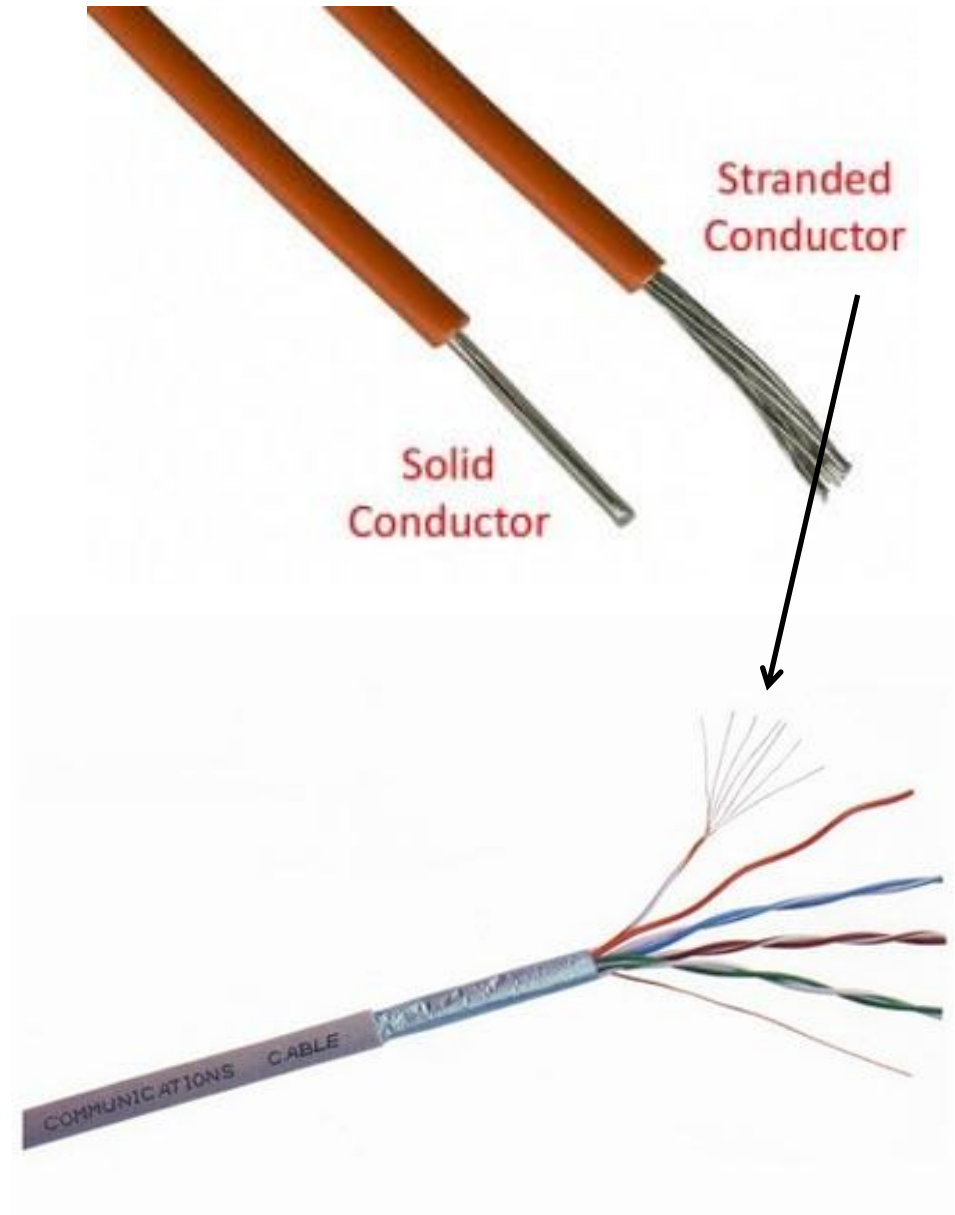
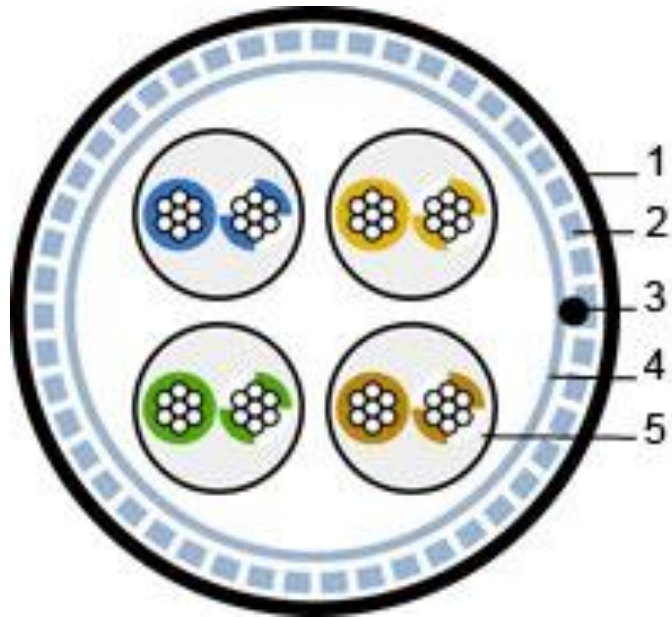


Cat 5: Cat 5 cable is available in two varieties: Unshielded Twisted Pair (UTP), the type widely used in the United States, and Screened Twisted Pair (ScTP), which has shielding to provide a measure of extra protection against interference, but is rarely used outside of Europe. Cables belonging to Category 5 are either solid or stranded: Solid Cat 5 is more rigid, and the better choice if data needs to be transmitted over a long distance, while stranded Cat 5 is very flexible and most likely to be used as patch cable. Cat 5 cable can support 10 or 100 Mbps Ethernet, and has a capability of up to 100MHz.



Cat 5e: Cat 5e (which stands for Category 5, enhanced) cable goes along the same lines as basic Cat 5, except that it fulfills higher standards of data transmission. While Cat 5 is common in existing cabling systems, Category 5e has almost entirely replaced it in new installations. Cat 5e can handle data transfer at 1000 Mbps (1 Gbps), is suitable for Gigabit Ethernet, and experiences much lower levels of near-end crosstalk than Cat 5.

Stranded cable



Kategórie káblov TP (STP)

- **Kategória 6:** štandard pre Gbit-ový ethernet. Šírka pásma 250 MHz, prísnejšie podmienky na vznik presluchov a odstup signálu od šumu
- **Kategória 6a:** rozšírenie kat. 6, šírka pásma 500 MHz, pren. rýchlosť 10 Gbit/s
- **Kategória 7:** kompatibilná s kat. 6 a 5. Prenosové rýchlosti až 10 Gbit/s. Je tienený každý pár. Konektor TERA, aj RJ – 45.

#	Cable Type	Band-Width	Data Rate
1	UTP	Analog voice	
2	UTP		1 Mbps
3	UTP/STP	16 MHz,	4 Mbps
4	UTP/STP	20 MHz,	16 Mbps
5	UTP/STP	100 MHz,	100 Mbps
5e	UTP/STP	100 MHz,	1 Gbps
6	UTP/STP	200 MHz,	10 Gbps (<10 m)
6a	UTP/STP	500 MHz,	10 Gbps (>10 m)
7	STP	600 MHz	10 Gbps
7a	STP	1000 MHz	40 Gbps (<15 m)

Cat 5e és Cat 6 kábelek

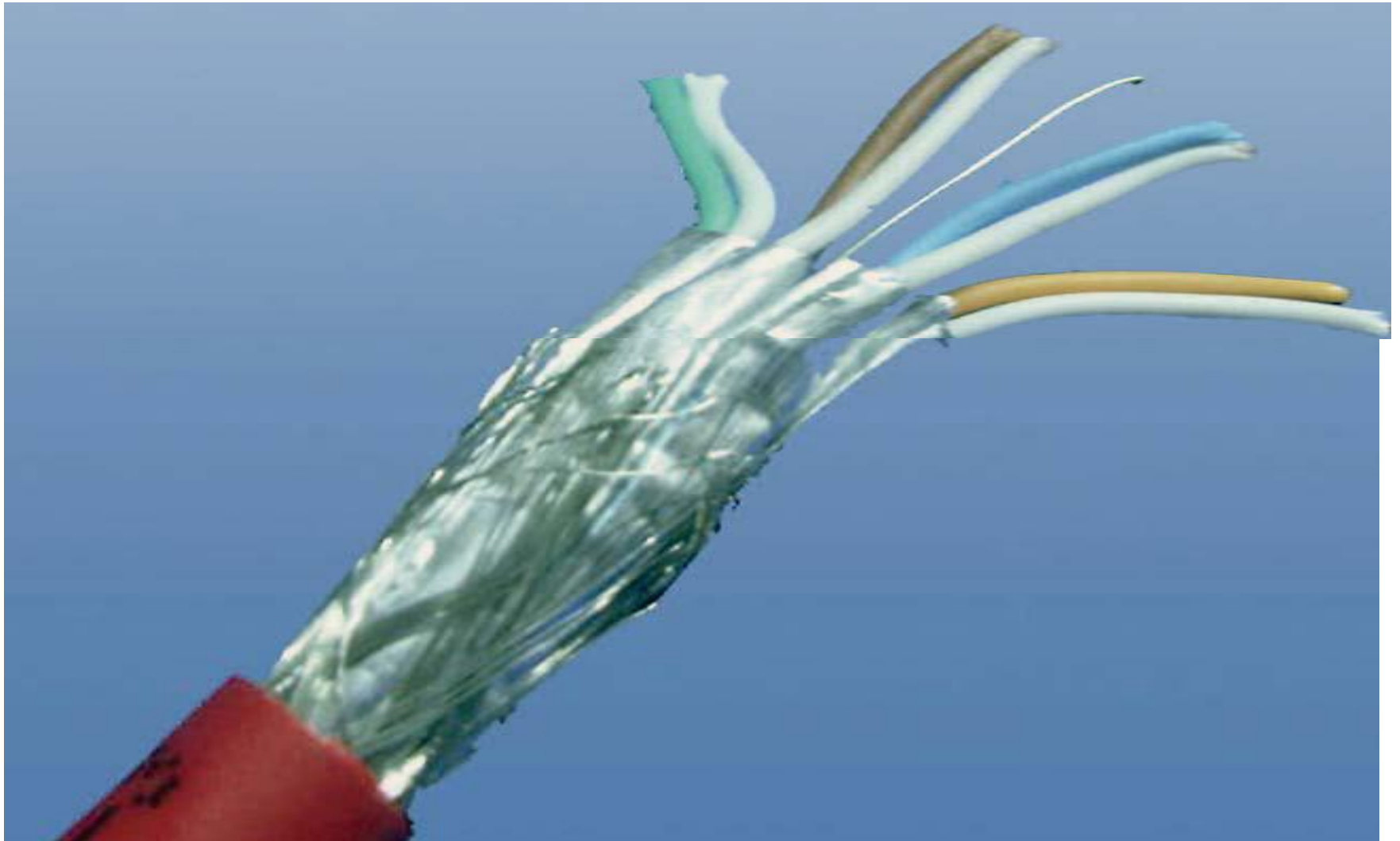
Cat 5e



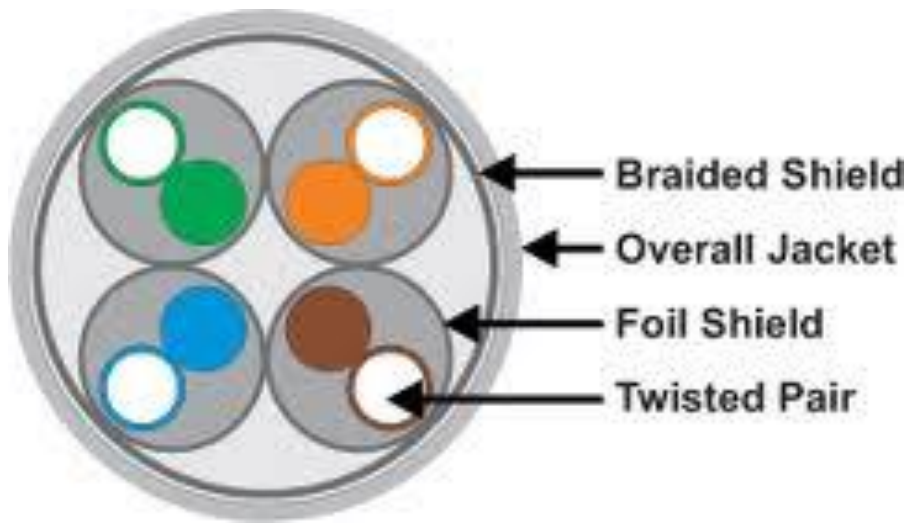
Cat 6



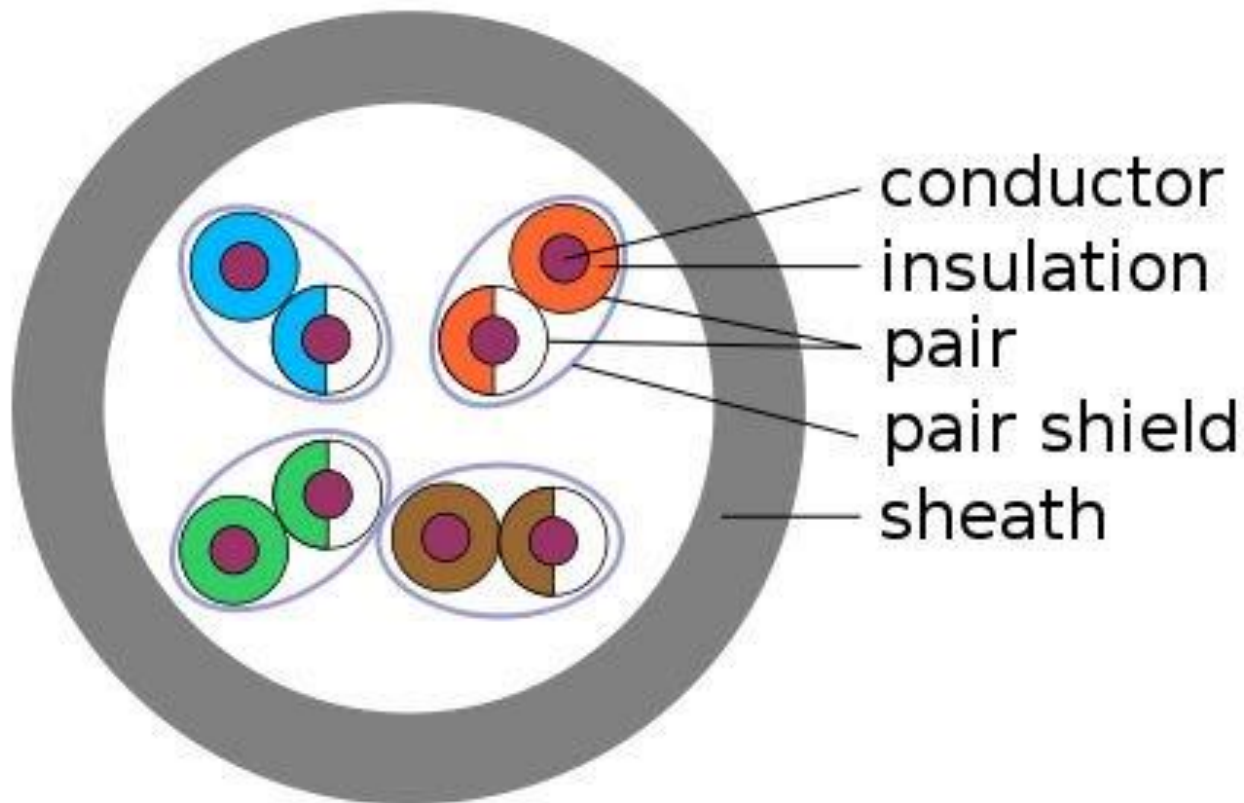
CAT7-es kábel



CAT7-es kábel



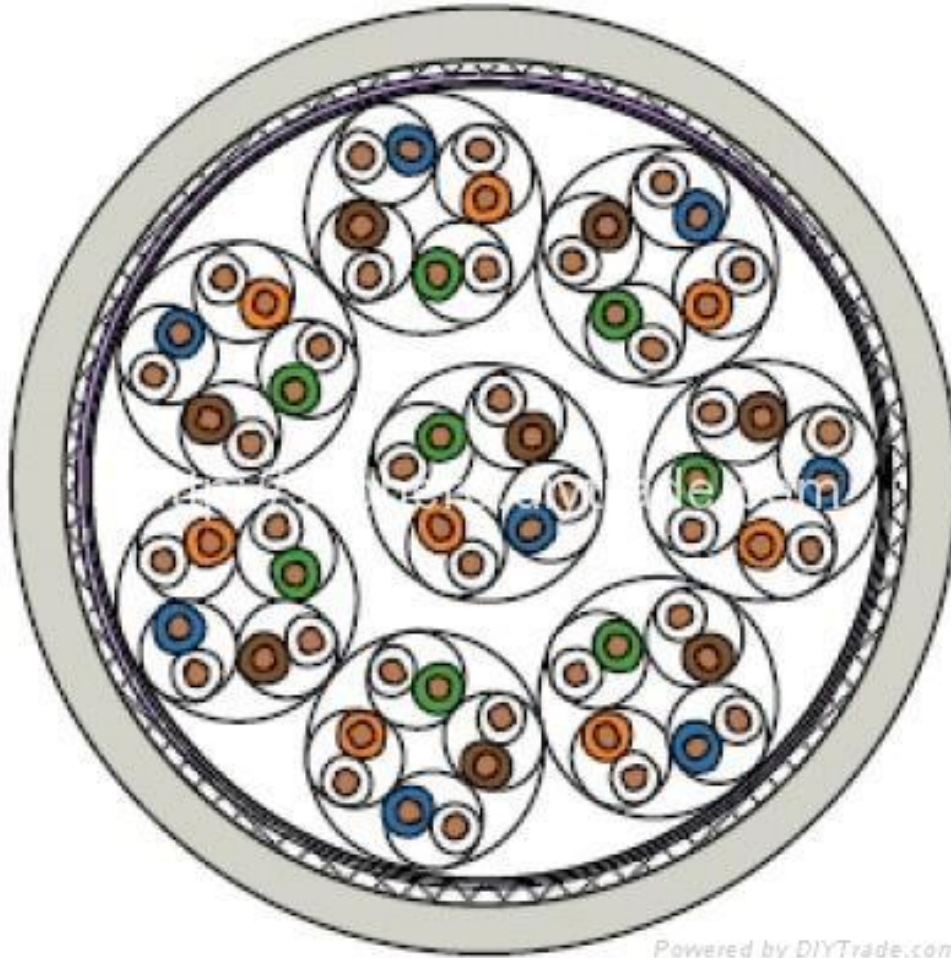
STP CAT7 cable construction



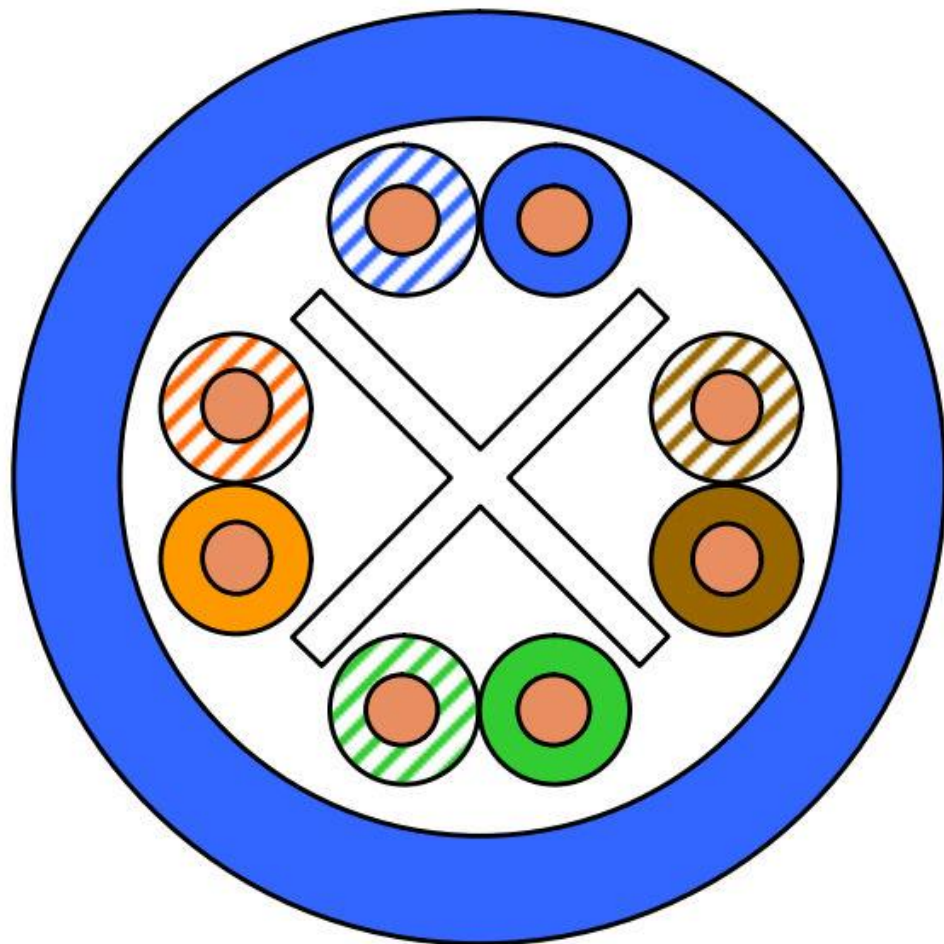
Konektor TERA (cat 7)



Category 5e twisted pair cable



Category 6 LAN cable

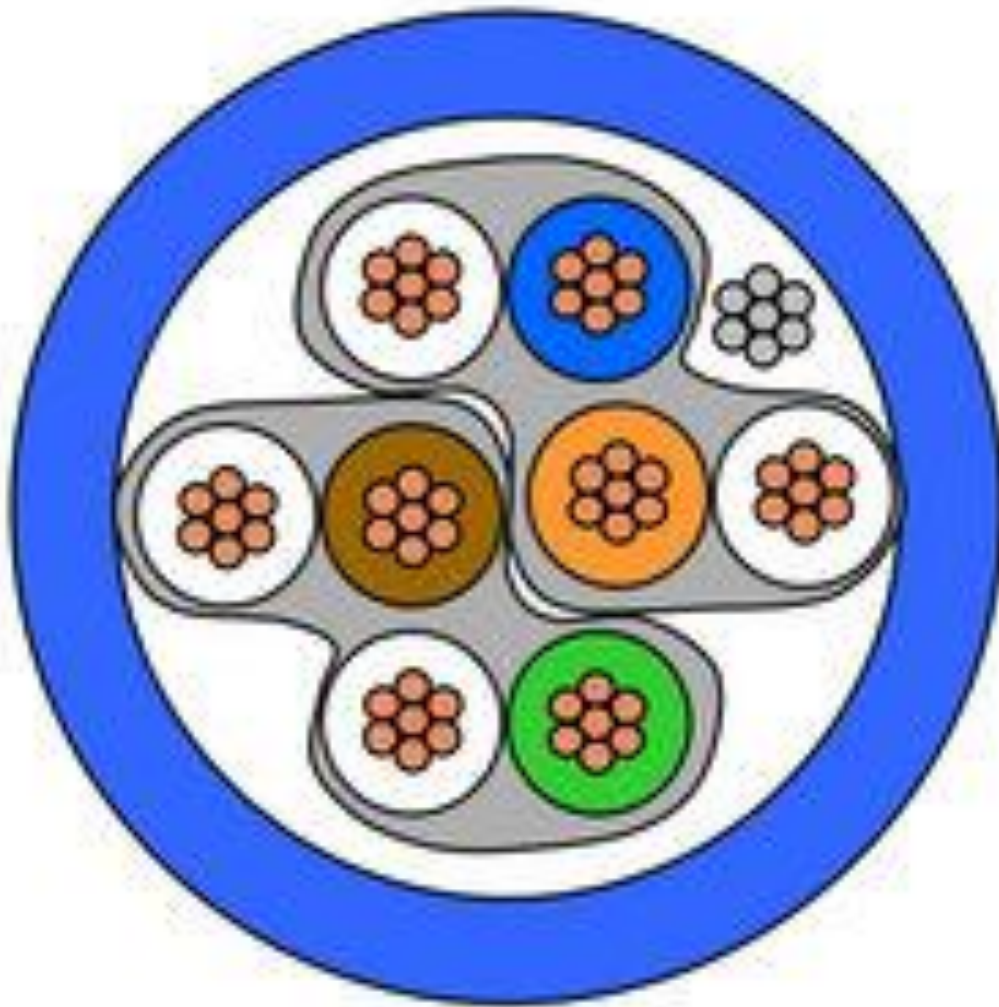


Copper data cables for future requirements

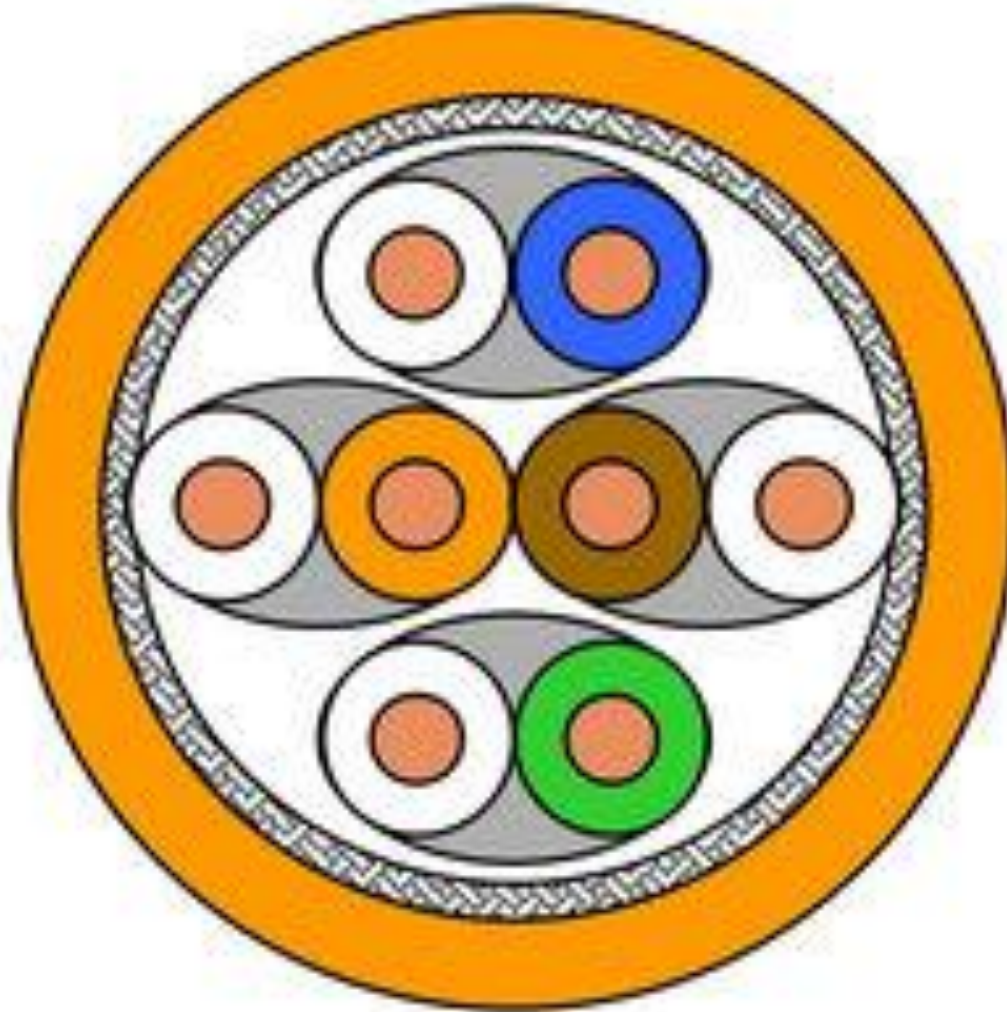
The data transmission according to 1-10 Gigabit-Base-T is based on a **full-duplex** principle i.e. via all cable pairs at the same time and parallel in both directions (bi-directional). This results in numerous closely tolerated transmission characteristics for cabling in future requirements.



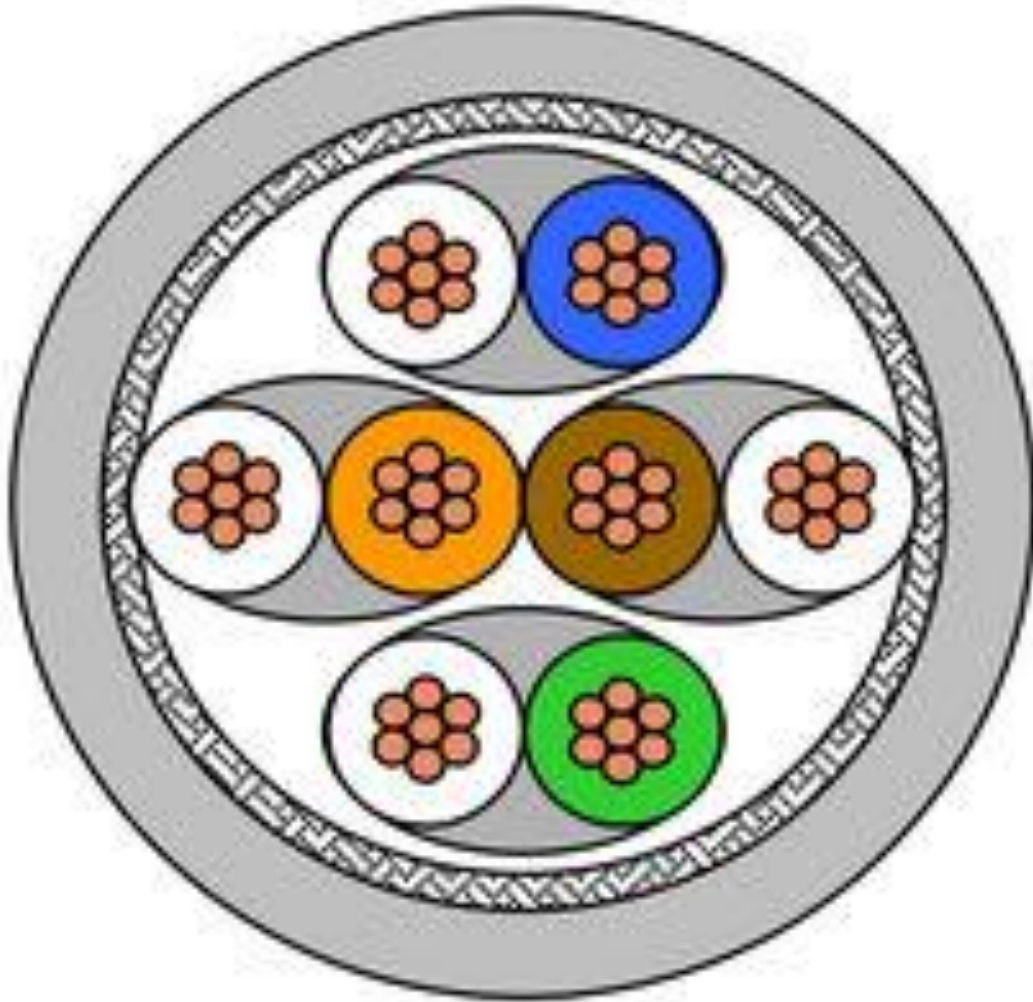
Category 6 LAN patch-cable



Category 7 LAN cable

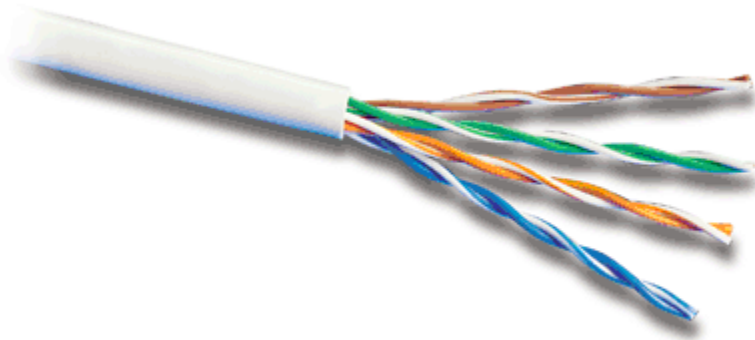


Industrial Ethernet cable



Industrial Ethernet copper data cables for tough industrial environments.

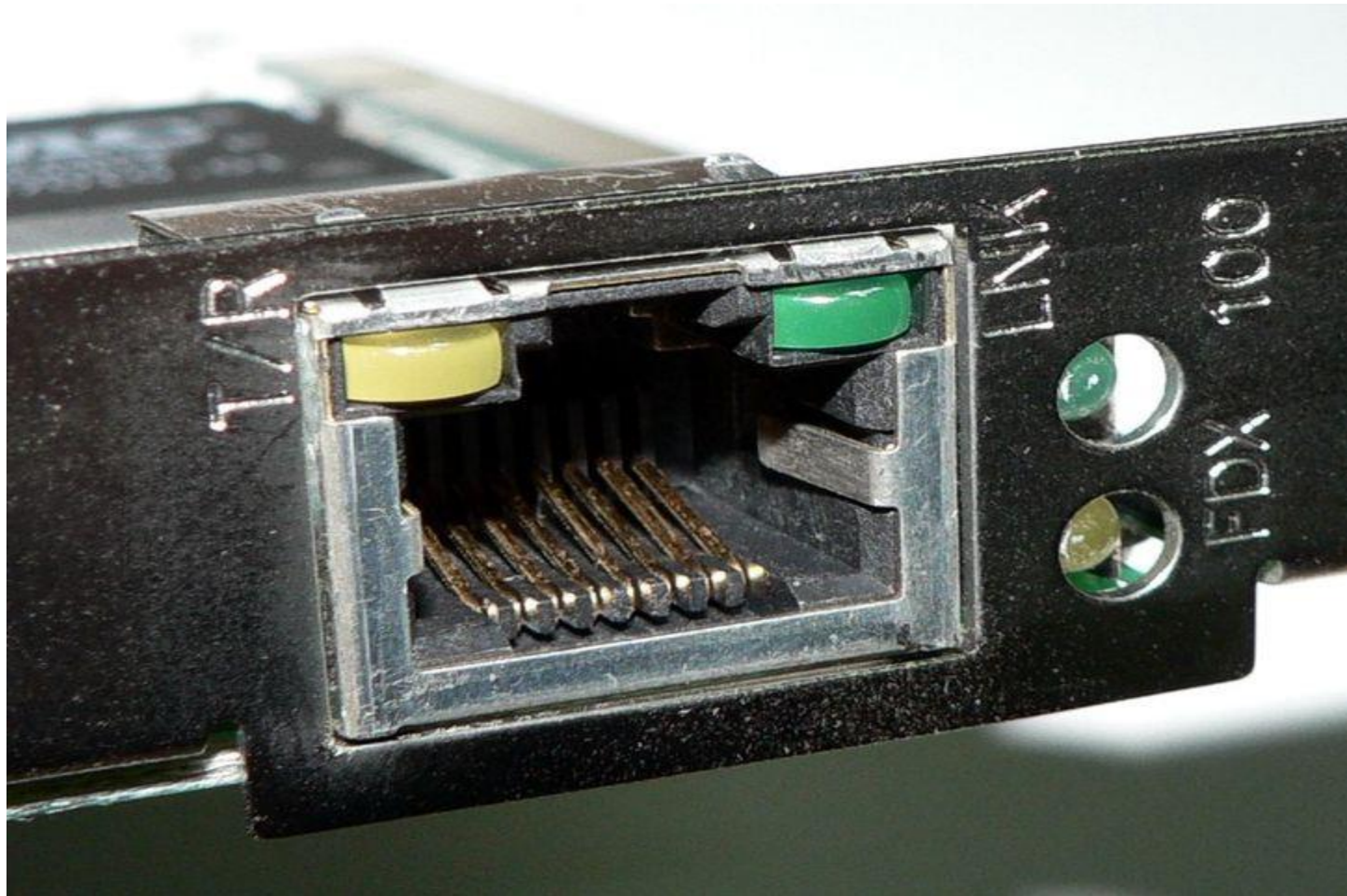
Cables are protected against temperature, fire, vibration, chemicals, moisture, EMC, mechanical stress, and other environmental challenges.



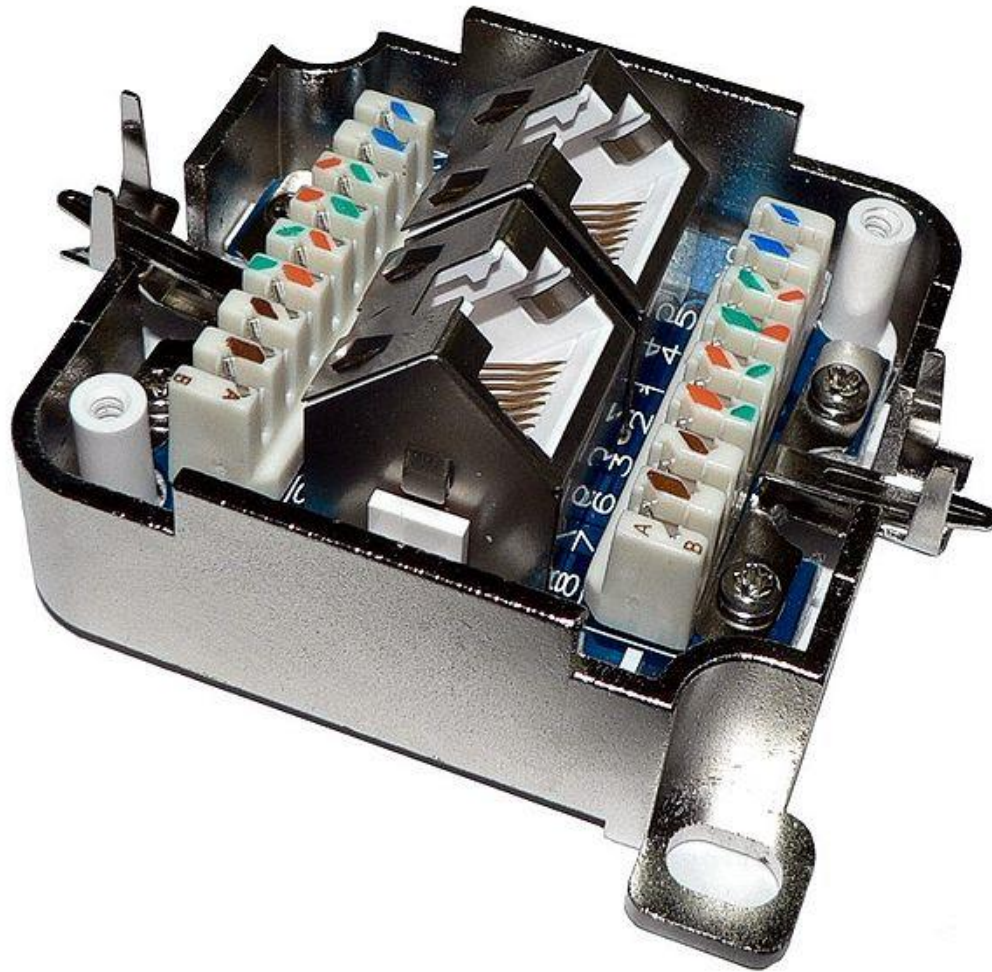
RJ-45

Konektor RJ 45 (female)

(RJ – Registered jack)



Konektor RJ 45 (female shielded double)



Konektor RJ 45 (mail)



Copper Media Connectors



110 punch block

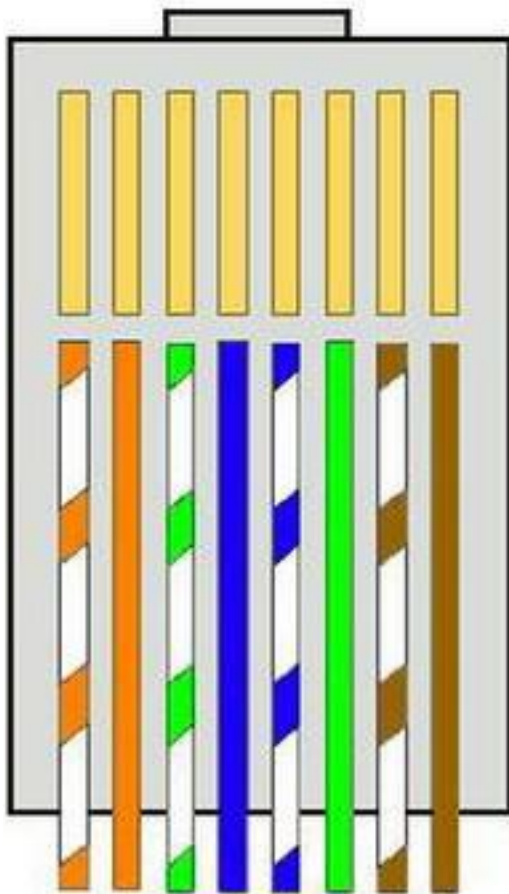


RJ-45 UTP
Plugs

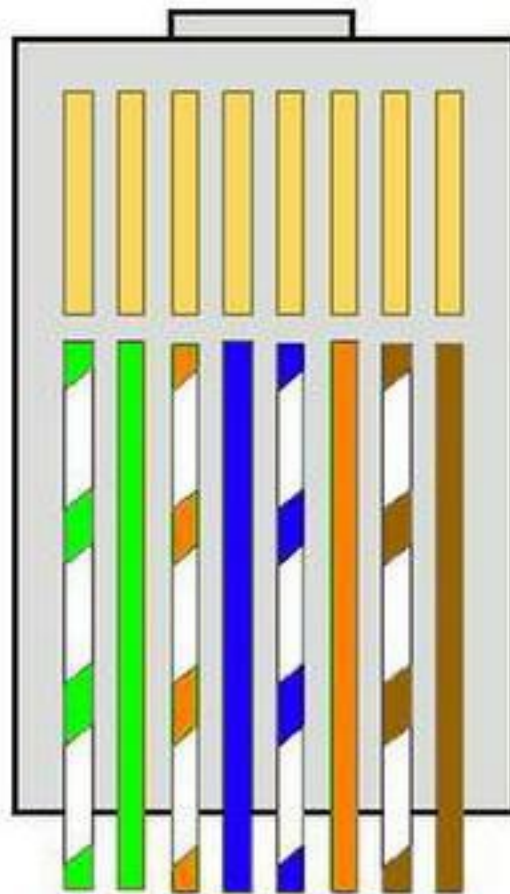


RJ-45 UTP
Socket



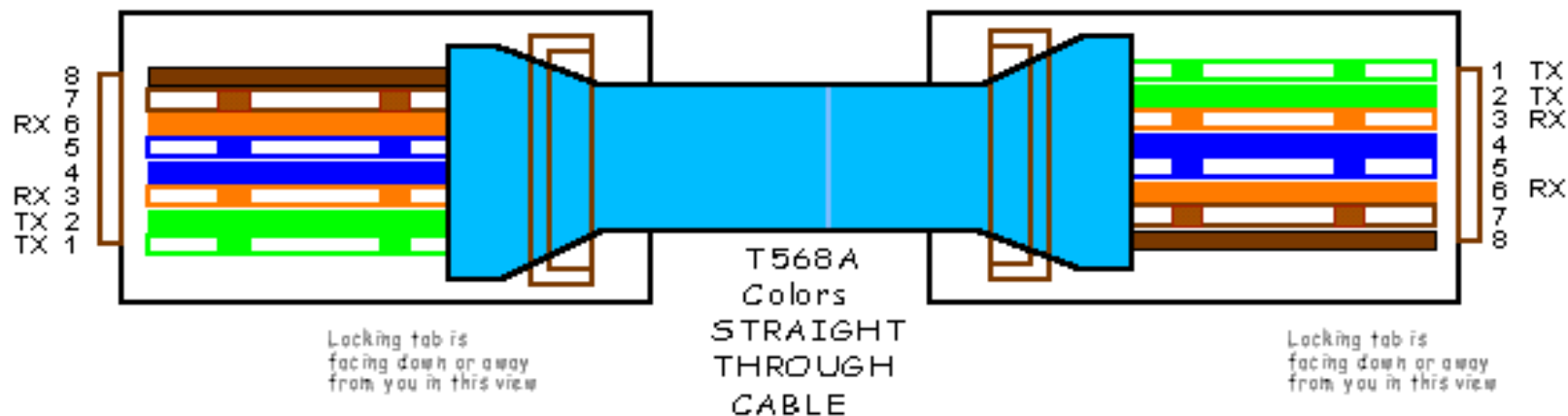


T568B

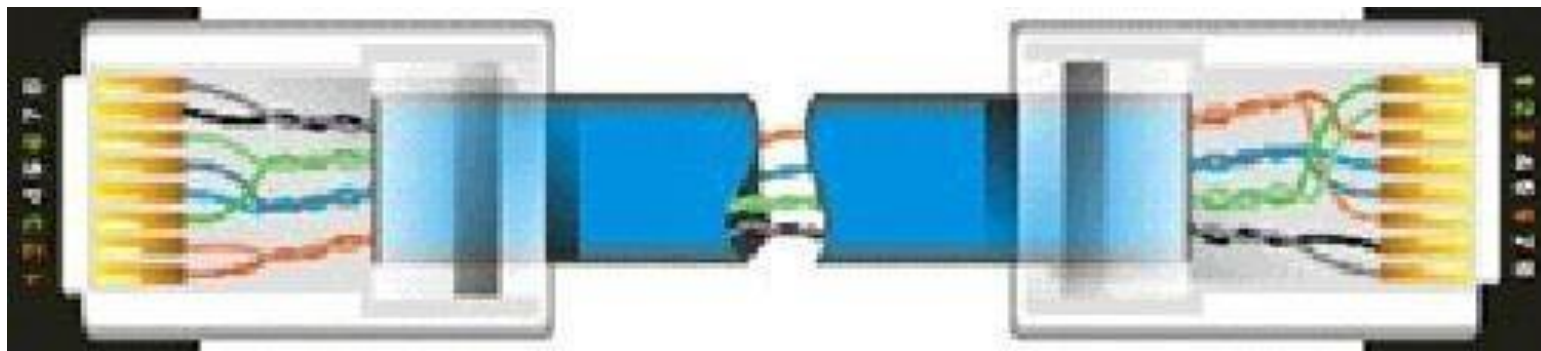


T568A

Pre spojovanie koncových staníc s aktívnym prvkami sa používa priamy kábel (T568A).



Na prepojenie medzi rozbočovačmi navzájom (switch – switch) alebo na prepojenie dvoch počítačov sa používa krížené zapojení káblov (T568B)



What's the Difference Between T568A and T568B?

Two wiring standards: T568A and T568B. While these standards are very similar and can oftentimes be chosen according to nothing more than the installer's preference, there are a few significant differences between the two, and it's very important to know about these before you begin to build – or expand – your network.

How are T568A and T568B similar?

The main similarity between T568A and T568B is that they both provide wiring schemes for terminating twisted-pair copper network cable (CAT cables) to 8-position RJ45 jacks and connectors. The pairs in this type of cable are based on four colors (blue, orange, green and brown), with each of pair consisting of solid-colored wire twisted together with another wire that's of the same color, but striped with white.

What makes them different?

At the two wiring diagrams only difference between T568A and T568B is that the pin positions for the **green and orange pairs** have been switched. But aside from the color reversals, there are a couple of compatibility factors that can affect your choice of an RJ45 wiring scheme.

What makes them different? (cont.)

T568A has been largely superseded by the more up-to-date T568B. T568B and has become – overall – the most widely chosen wiring schematic because it matches AT&T's old 258A color code, but at the same time accommodates for current and future needs. In addition, T568B offers backward compatibility with USOC, though for only one pair.

Can T568A and T568B be combined or interchanged? How do You know which one to use?

As a general rule, T568A and T568B should not be combined or interchanged. Keeping in mind that T568B is the preferred format for new networks in the United States, you're (technically) free to choose either wiring scheme for cases in which a new network is being built from the ground up. But when an existing network infrastructure is being expanded upon, it's vital that you find out (through either records or cable testing) which wiring schematic was originally used, and continue on within that standard.

Can T568A and T568B be combined or interchanged? How do You know which one to use? (cont.)

Why is it so important that cabling updates and additions be made in accordance with the network's original wiring standard? Continuity. It's simple, really... if the wires don't match up color-to-color and stripe-to-stripe when plugs and jacks are connected, data signals just won't transfer.

Can T568A and T568B be combined or interchanged? How do You know which one to use? (cont.)

There are rare instances when T568**A**-wired components need to be connected to T568**B**-wired components, and in these cases, a **crossover cable** (a patch cord that has an **A**-configured plug at one end, and a **B**-configured plug at the other) is used to smoothly transition between standards without compromising data.

MDIX

RD+

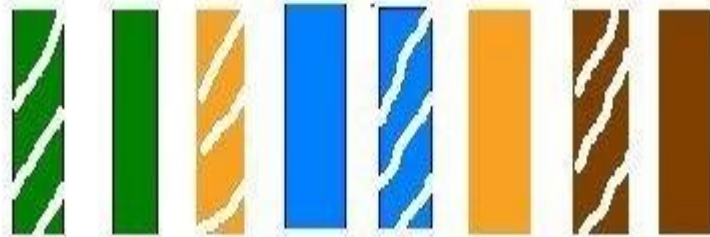
RD-

TD+

TD-

1 2 3 4 5 6 7 8

568A



MDI

TD+

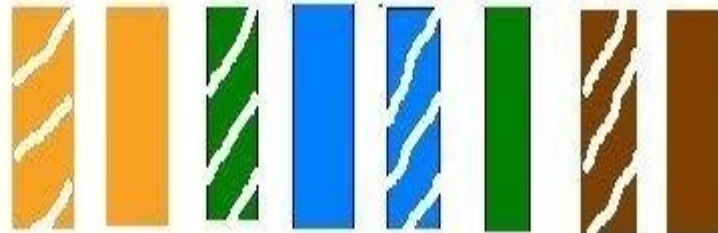
TD-

RD+

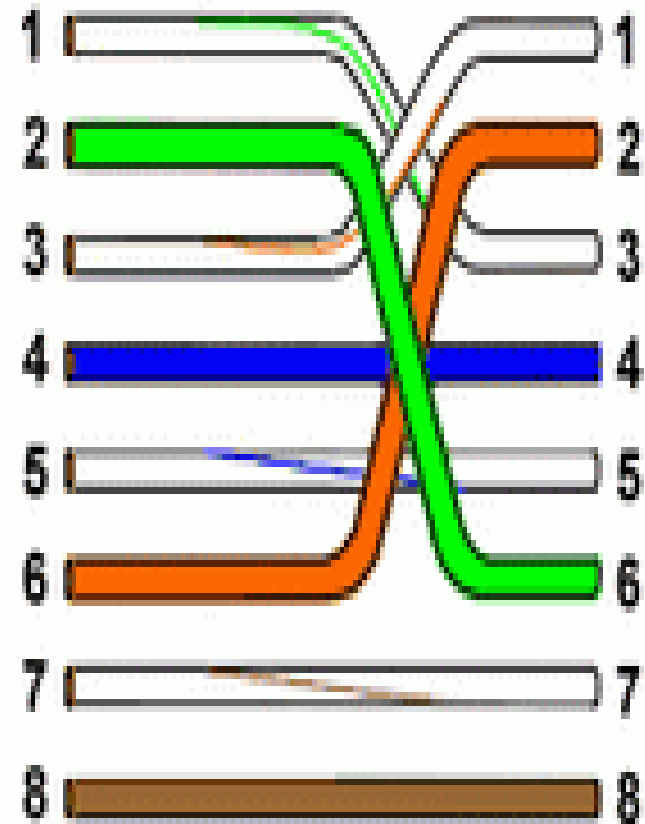
RD-

1 2 3 4 5 6 7 8

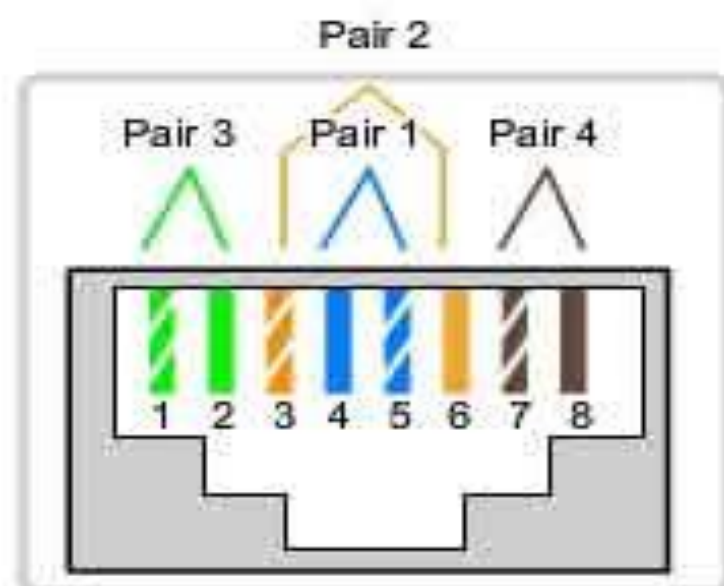
568B



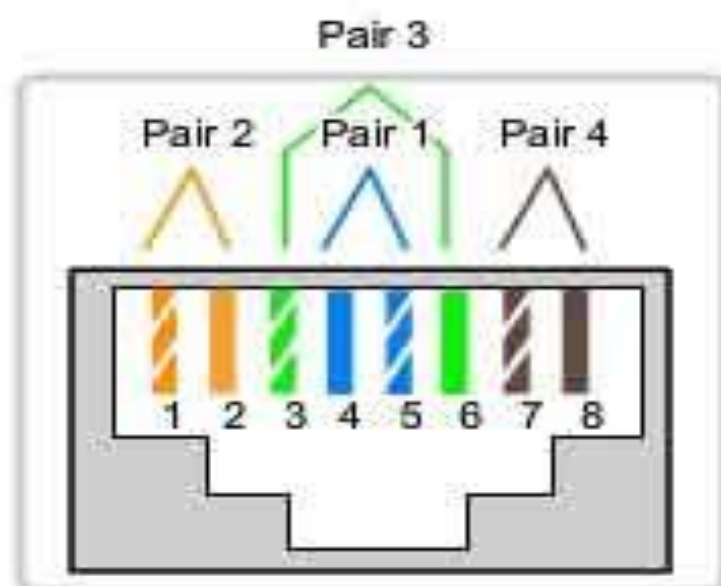
Zkřížení kabelu



RJ-45 T568A & T568B Termination



T568A



T568B



T568A
(Top View)



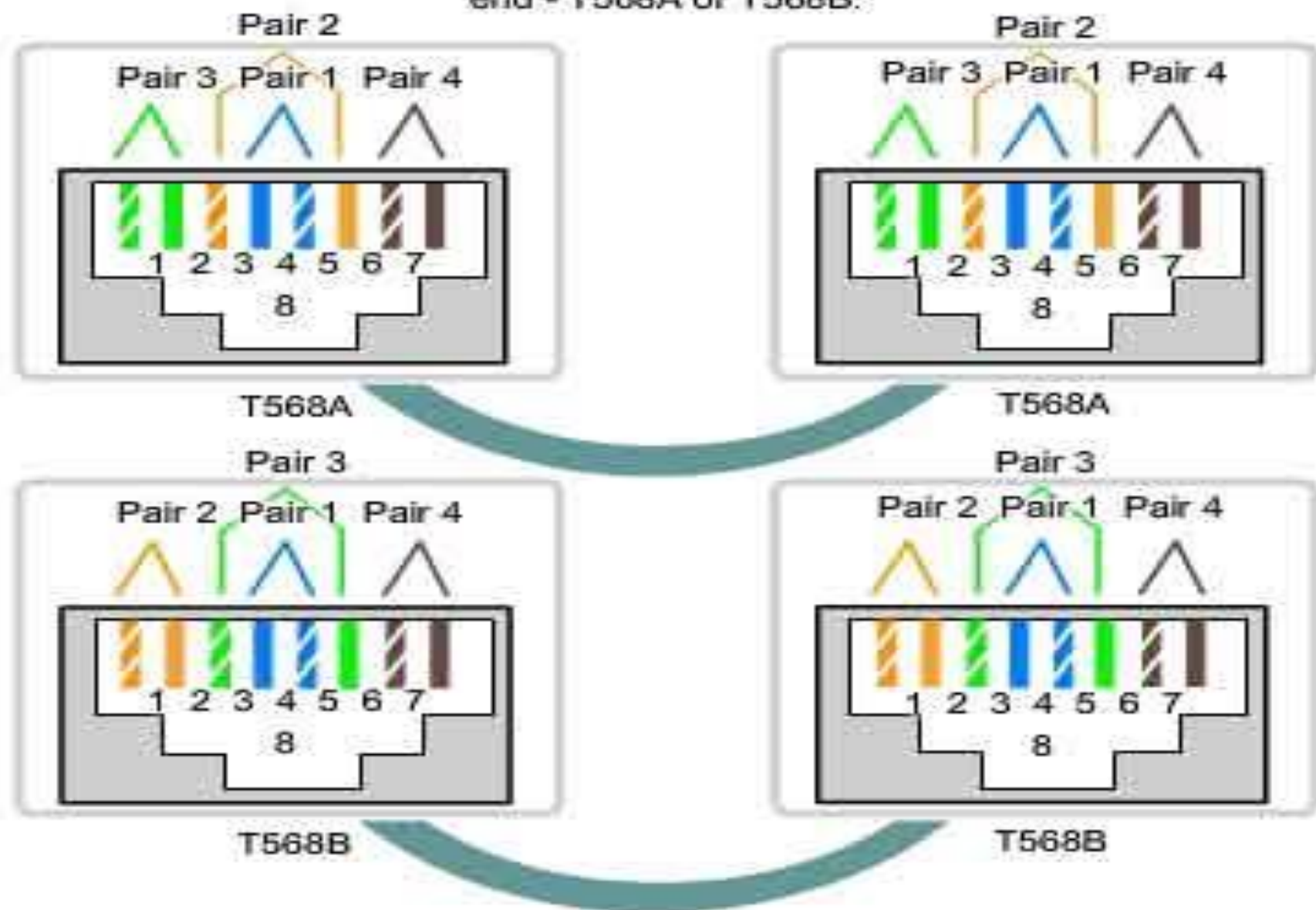
T568B
(Top View)

Typy káblov

- **Priamy** (straight) – na prepojenie navzájom
 - Rozbočovač(hub) / prepínač (switch) s počítačom
 - Smerovač (router) s prepínačom (switch)
- Na oboch koncoch kábla sú vodiče usporiadané podľa normy EIA/TIA-568A alebo 568B (je to jedno)

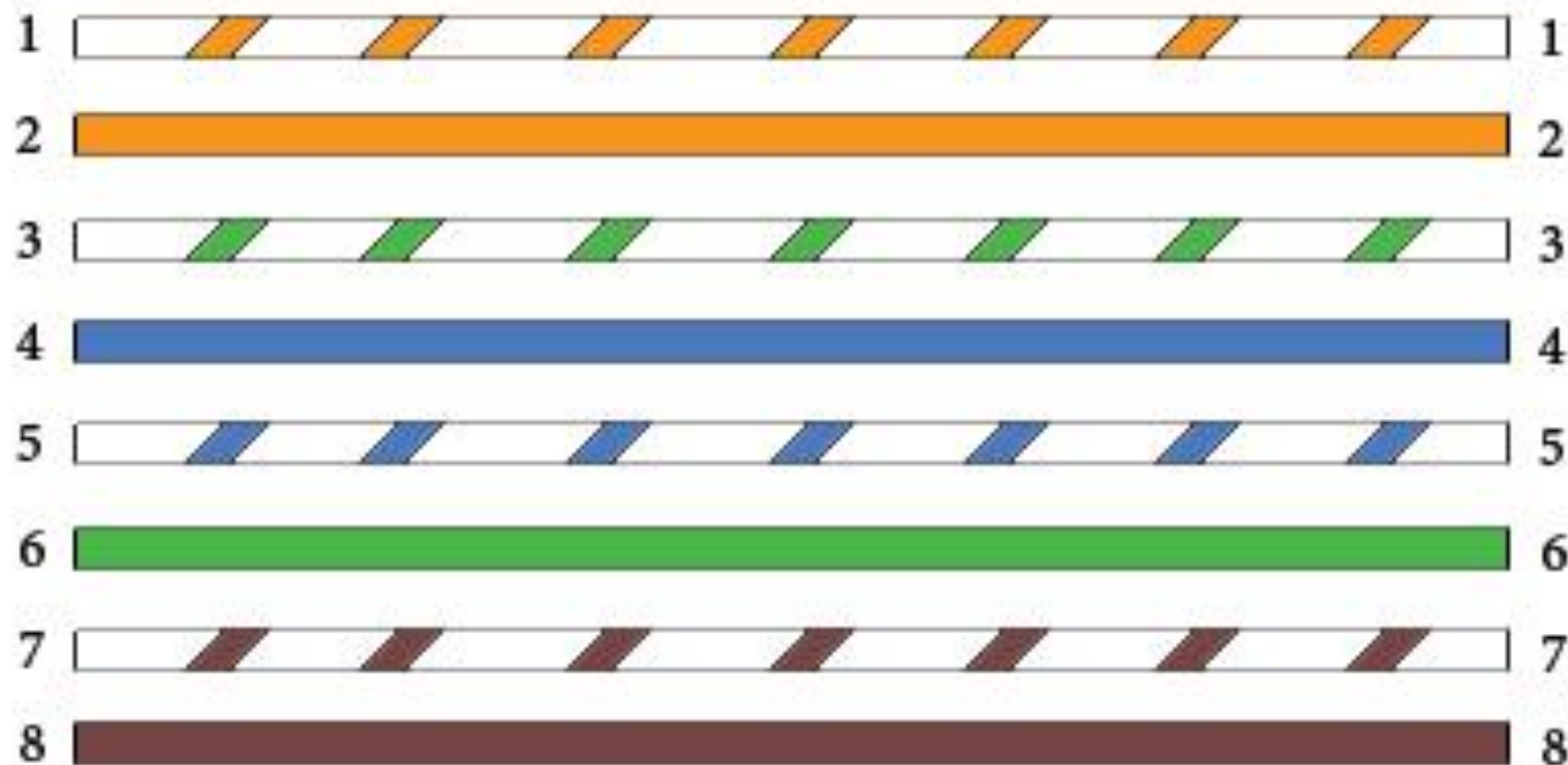
Straight-Through Cable

Straight-through cables have the same termination at each end - T568A or T568B.



Straight Through Wiring Guide

568-B

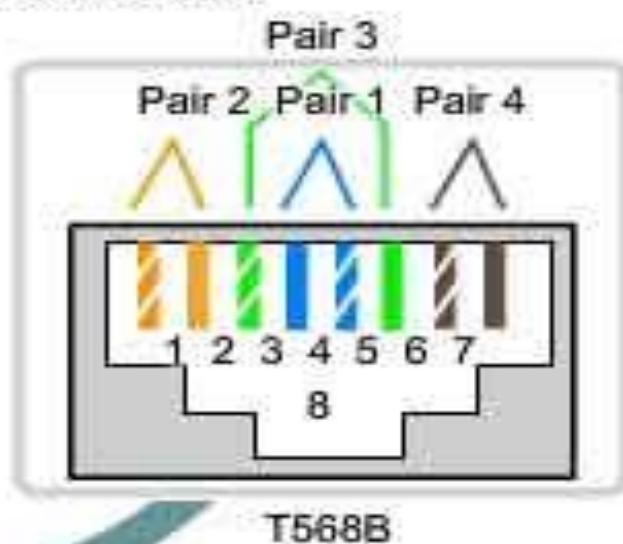
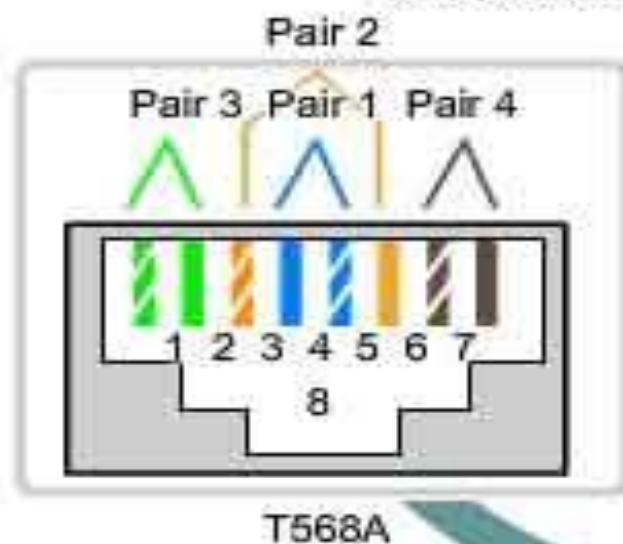


Typy káblov

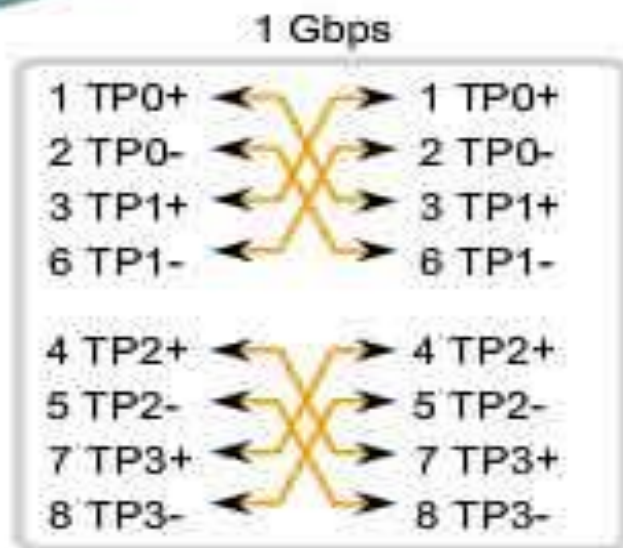
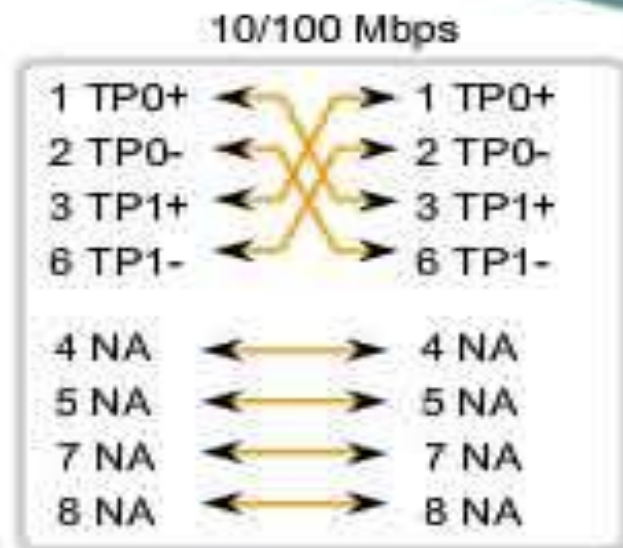
- **Krížový** (crossover) – na prepojenie dvoch „rovnakých“ zariadení, napr. dvoch počítačov, rozbočovačov, prepínačov, smerovačov. Na jednom konci kábla sú vodiče usporiadané podľa EIA/TIA-568A, na druhom 568B. Je jedno, na ktorom konci je aké usporiadanie.

Crossover Cable

Crossover cables have a T568A termination at one end and a T568B termination at the other end.

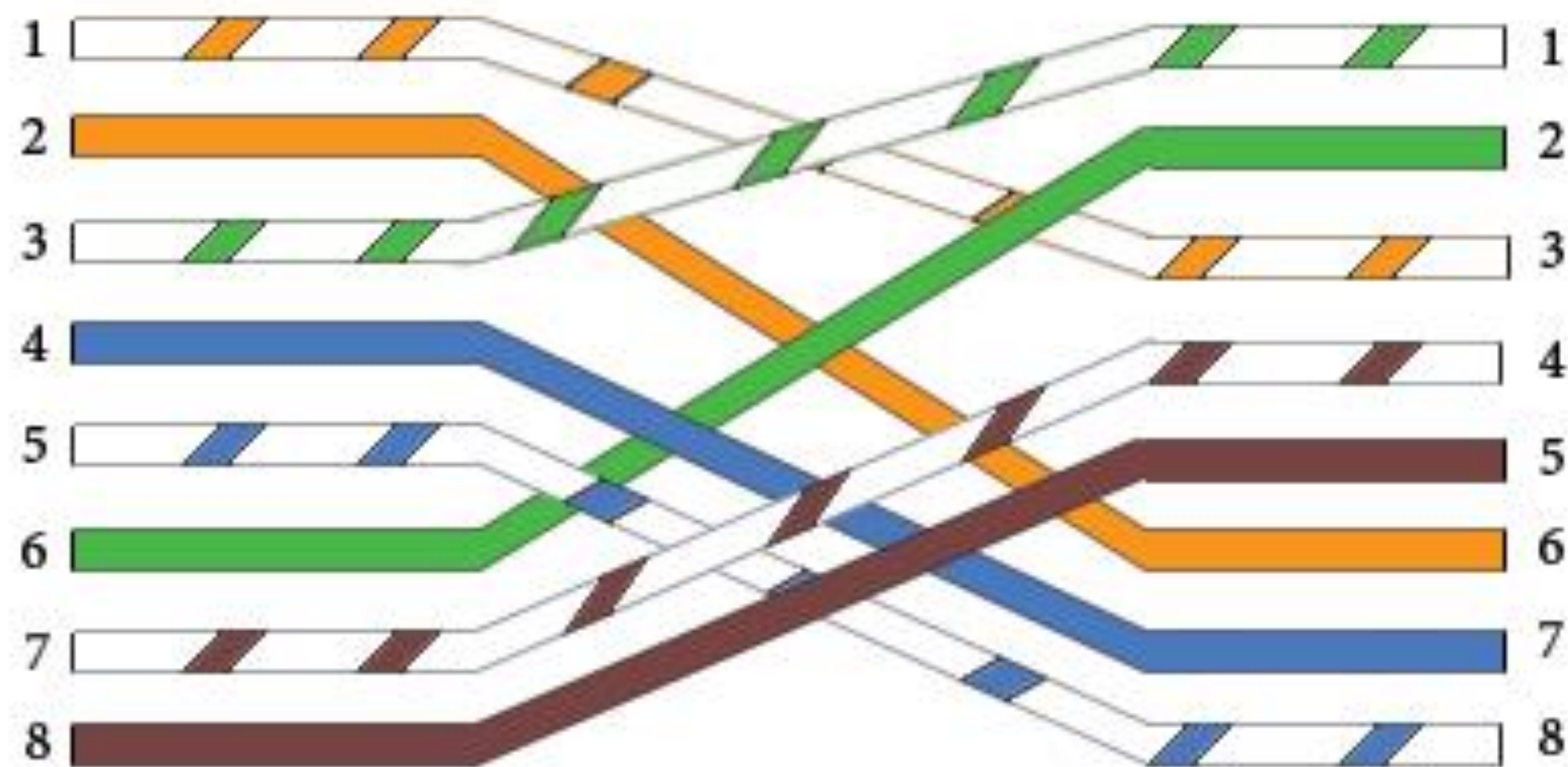


Transmit pins at each end connect to the receive pins at the other end.

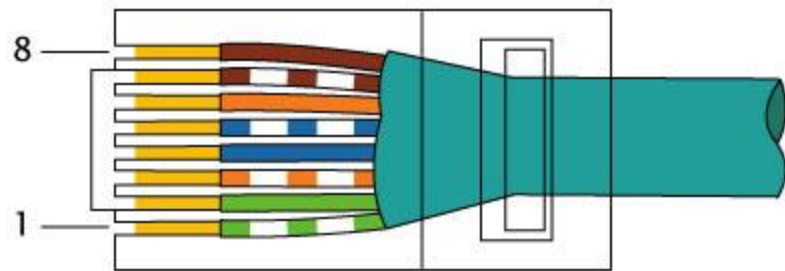


Crossover Wiring Guide

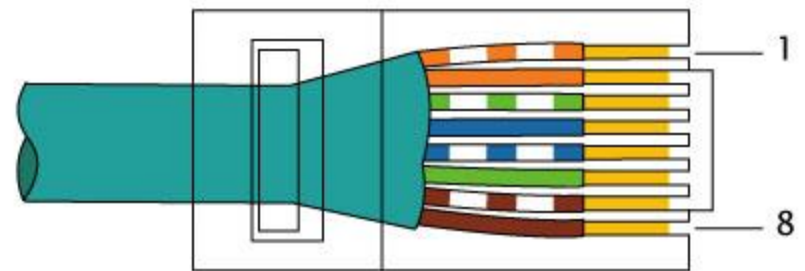
568-B



Ethernet Crossover Cable with RJ45 Connectors

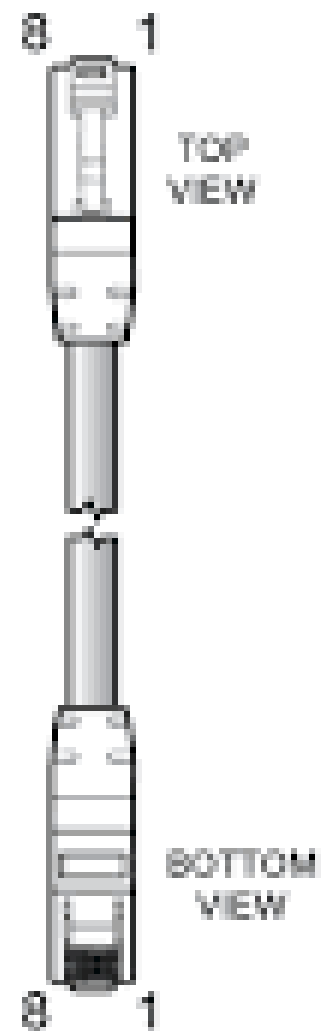
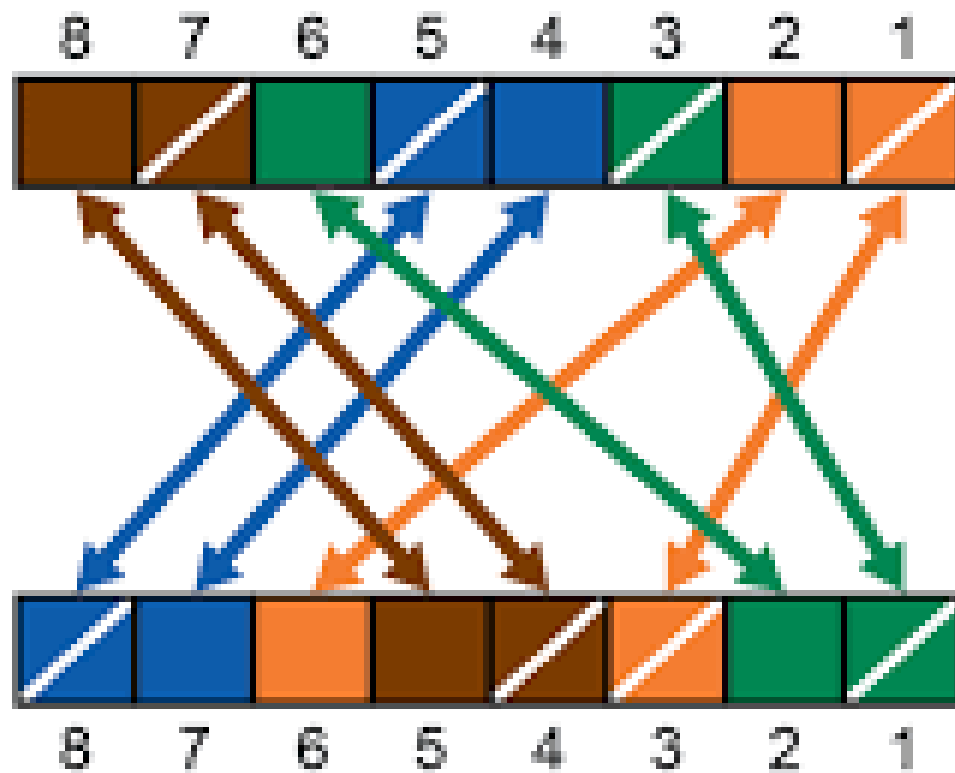


EIA/TIA-568A



EIA/TIA-568B

Crossover



Ultimate cross over cable's How To

Follow the code of colors to find out how to put the wires



WO



O



WG



Bl



WBl



G



WBr



Br



1

2

3

4

5

6

7

8



WG

WG



G



WO



Bl



WBl



O



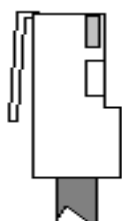
WBr



Br



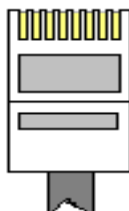
RJ-45 Male Plug



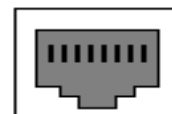
8 7 6 5 4 3 2 1



1 2 3 4 5 6 7 8



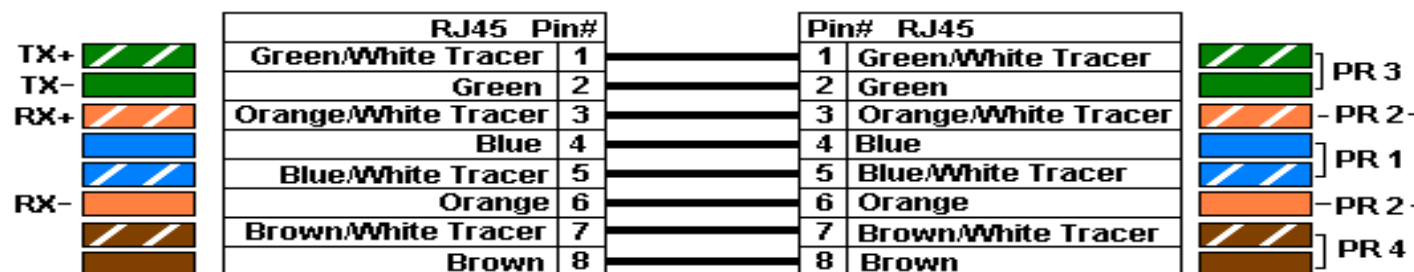
1 2 3 4 5 6 7 8



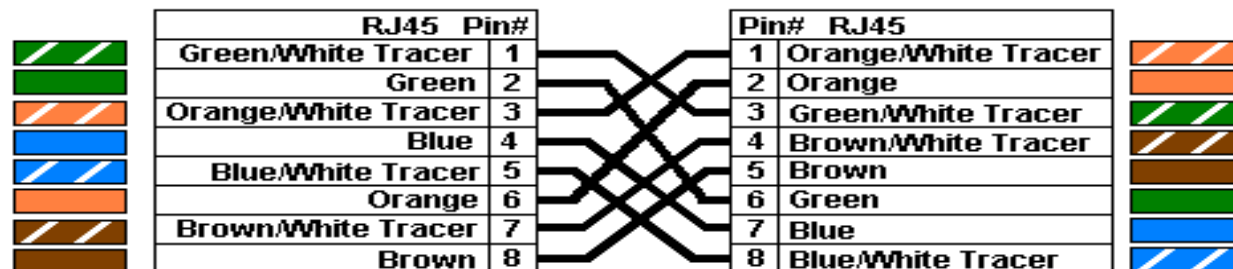
RJ-45 Female

Color Standard
EIA/TIA T568A

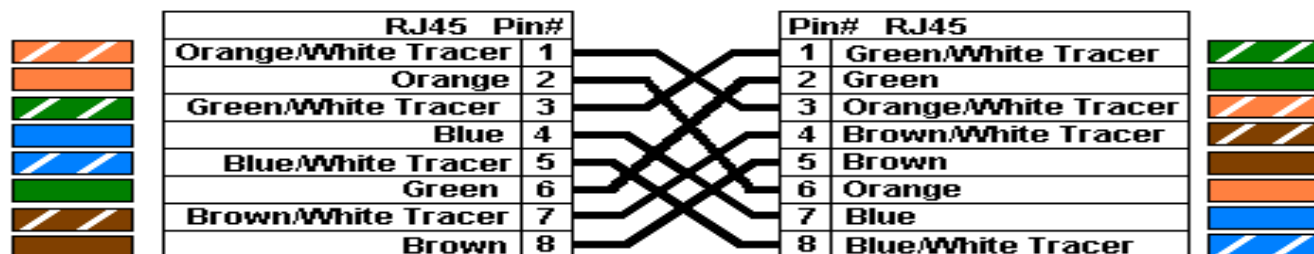
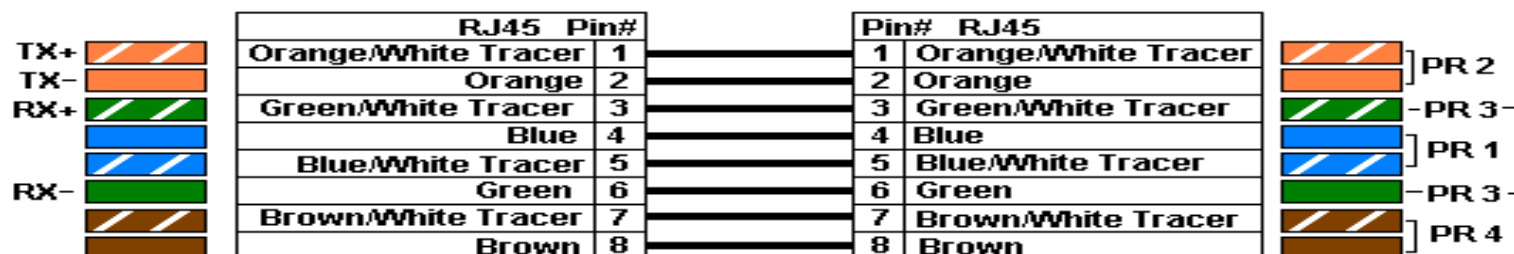
Ethernet Patch Cable

Color Standard
EIA/TIA T568A

Ethernet Crossover Cable

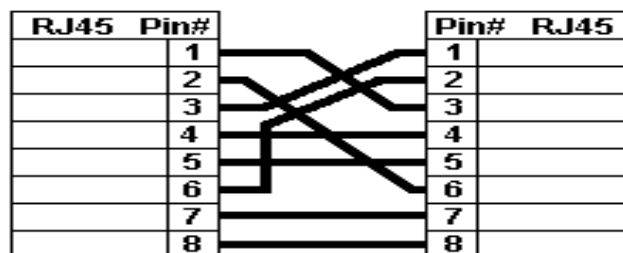


"A" is earlier



"B" is most recent

Common Ethernet Crossover Cables may only
cross connect the Orange & Green pairs



B&B MODELS:
C5UMB3FOR-CROSS
C5UMB7FOR-CROSS

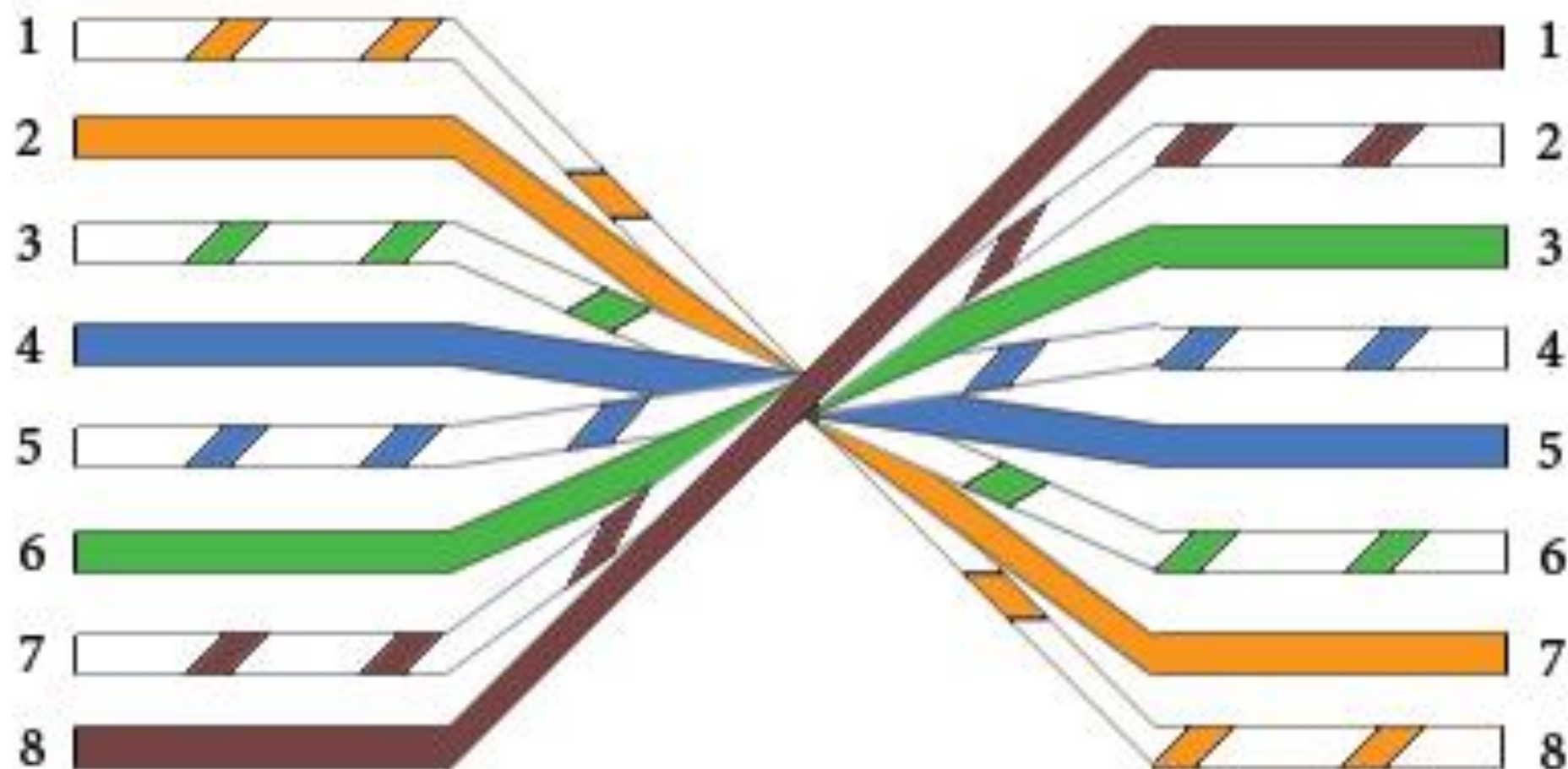
Pins #4 & #5 and #7 & #8 connect without
crossing for PoE devices using these for
Power Over Ethernet

Typy káblov

- **Prevrátený** (rollover) – pripájame aktívne zariadenie, ktoré možno konfigurovať pomocou sériového rozhrania počítača, napr. prepínače (switch) a smerovače (router) firmy Cisco.

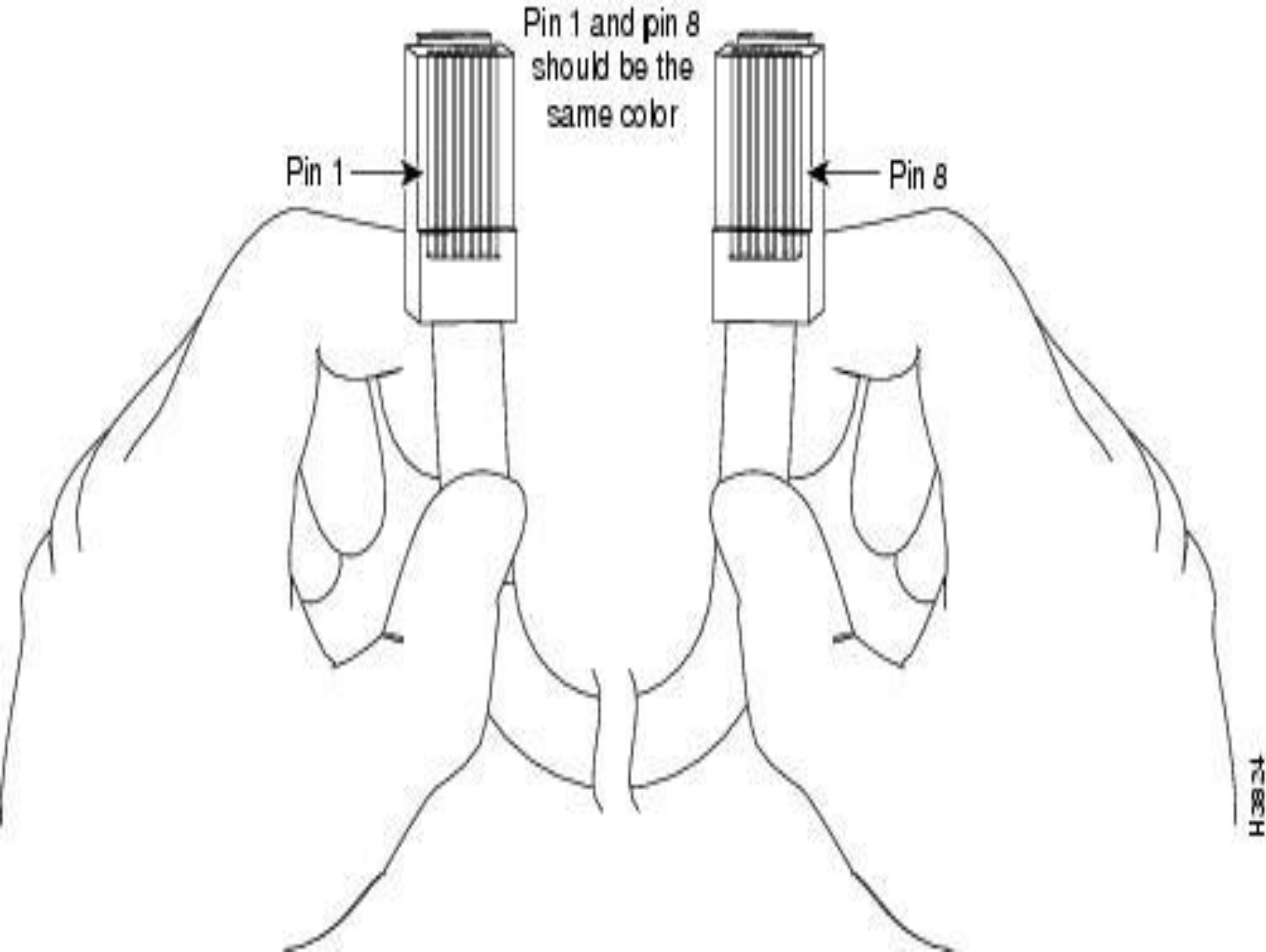
Rollover Wiring Guide

568-B



Rollover Cable

Rollover cable by comparing the two modular ends of the cable. Holding the cables side-by-side, with the tab at the back, the wire connected to the pin on the outside of the left plug should be the same color as the wire connected to the pin on the outside of the right plug. If your cable was purchased from Cisco Systems, pin 1 will be white on one connector, and pin 8 will be white on the other.

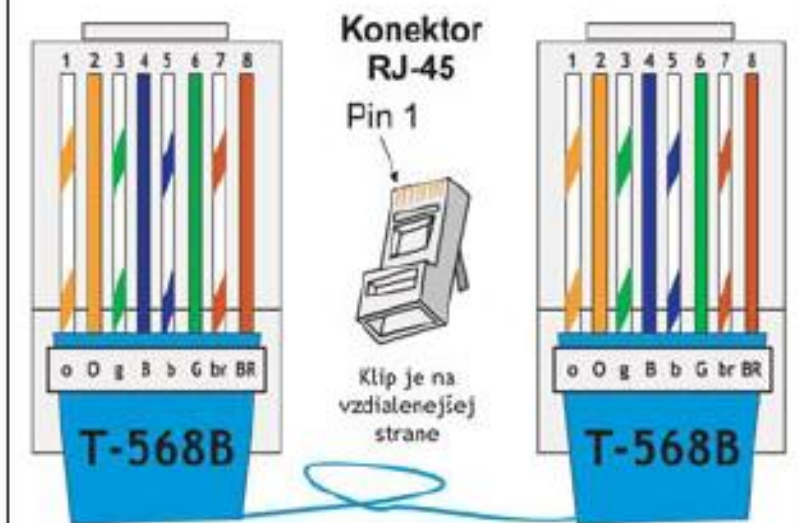
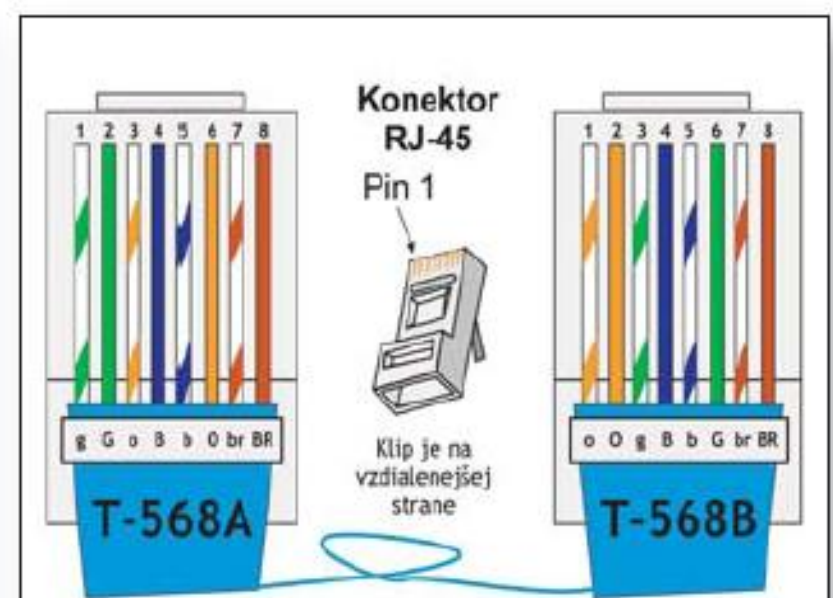
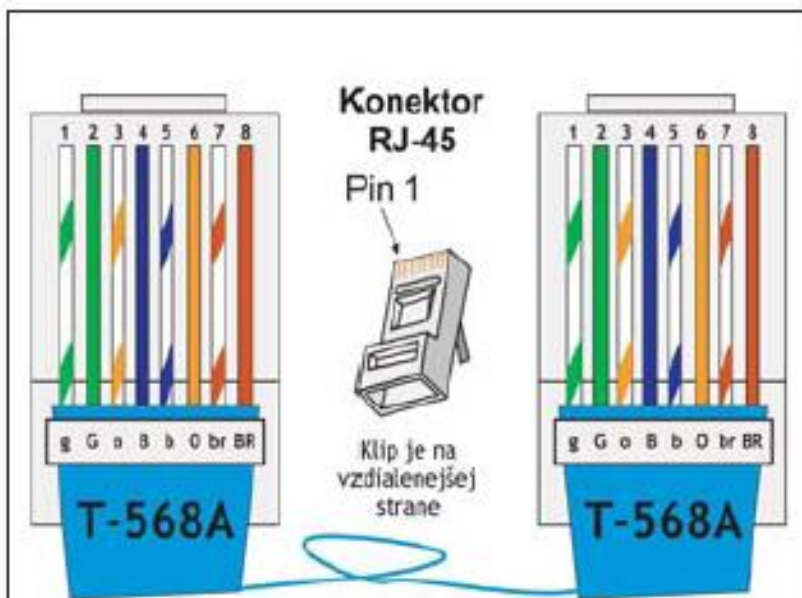


Rollover Cable Pinout

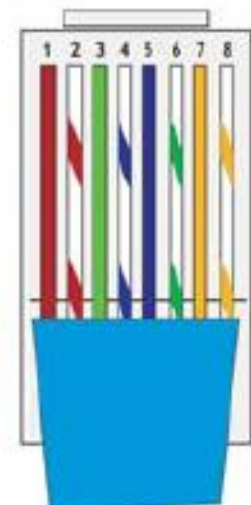
The pattern in which the color coded wires of a network cable are secured to a connector is called a "pinout." The wires of a rollover network cable are secured to the cable's connectors in a pattern that is the opposite on each end of the cable. This means that the sequence of the wires in one connector are mirrored (reversed) in the other connector.

Uses of Rollover Cable

Rollover cables, like other cabling types, got their name from how they are wired. Rollover cables essentially have one end of the cable wired exactly opposite from the other. This essentially “rolls over” the wires- but why would we need to do such a thing? Rollover cables, also called **Yost cables**, usually connect a device to a router or switch’s console port. This allows a programmer to make a connection to the router or switch, and program it as needed



RJ-45 prevrátený



Použitie káblov - zhrnutie

- **Priamy kábel** (straight-through cable)
Rôzne zariadenia: switch - router, switch - PC, hub - PC.
- **Krížový kábel** (crossover cable):
Rovnaké zariadenia: switch - switch, switch - hub, hub - hub, router - router, PC - PC, router – PC.
- **Konzolový (prevrátený) kábel** (rollover cable):
Prepojenie sériového COM portu na PC so sieťovým zariadením (napr. prepínač, smerovač).
Slúži na konfigurovanie sieťových zariadení
{rollover – kábel RJ45-RJ45, adaptér RJ45-DB9 alebo RJ45-DB25 (do COM portu PC)}

Connecting 2 Computers with Ethernet Cable

<http://www.youtube.com/watch?v=0J4vY8rHelc>

<https://www.youtube.com/watch?v=7iSC9yXxVVc>

A Power over Ethernet (PoE)

egy olyan technológia, amely lehetővé teszi a készülékek számára, hogy a működésükhöz szükséges áramot az Ethernet adathálózaton keresztül kapják.

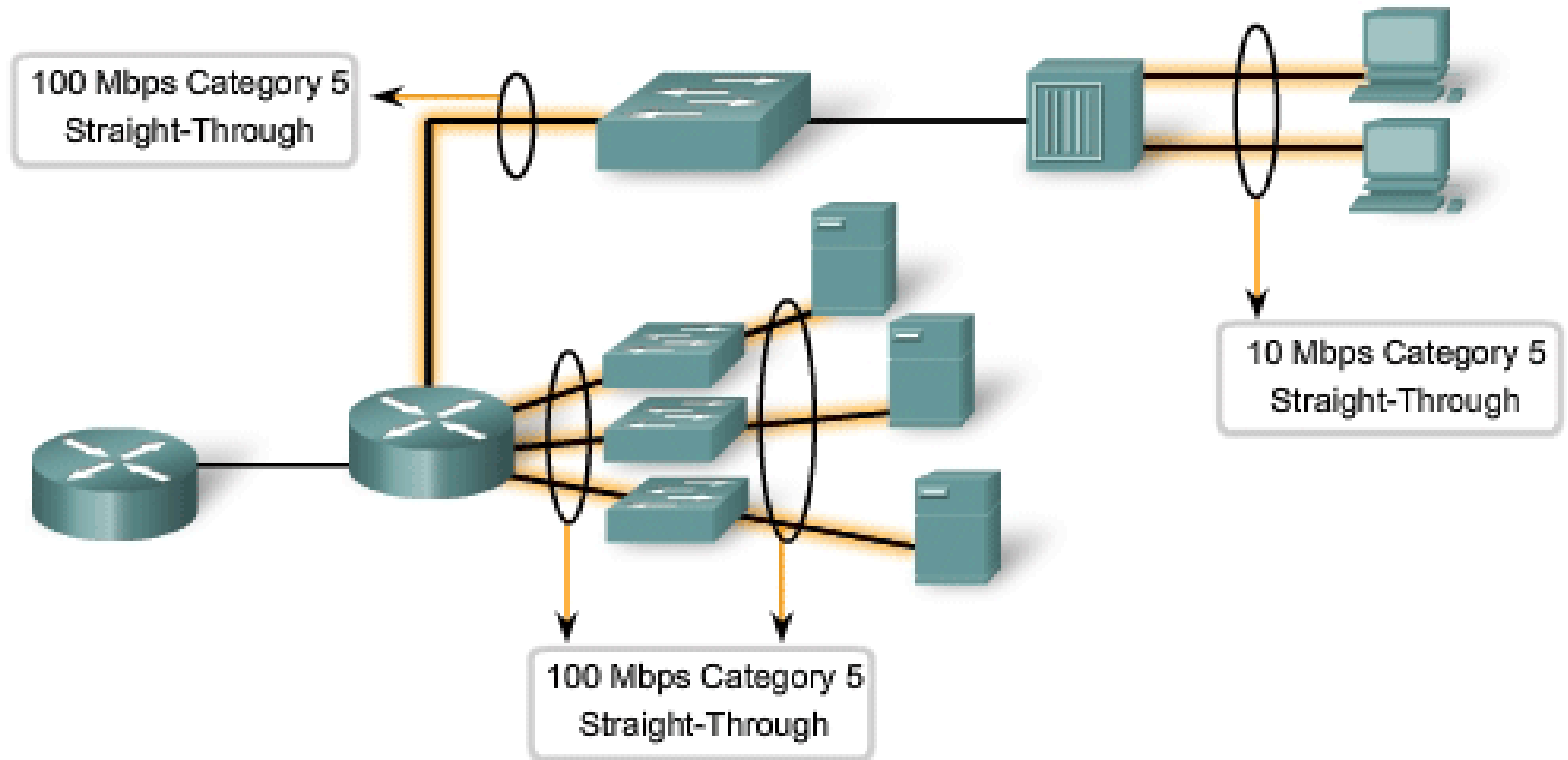
A PoE technológiát kezdetben a gyártók saját implementációban (egységesség nélkül) kezdték el forgalmazni, majd később az IEEE 802.3af alatt szabványosították. A specifikáció max. 48 V feszültséghez 350 mA áramot enged meg.



Ez a WLAN hozzáférési pont egy erre felkészített Ethernet hálózati végpontból kap áramot

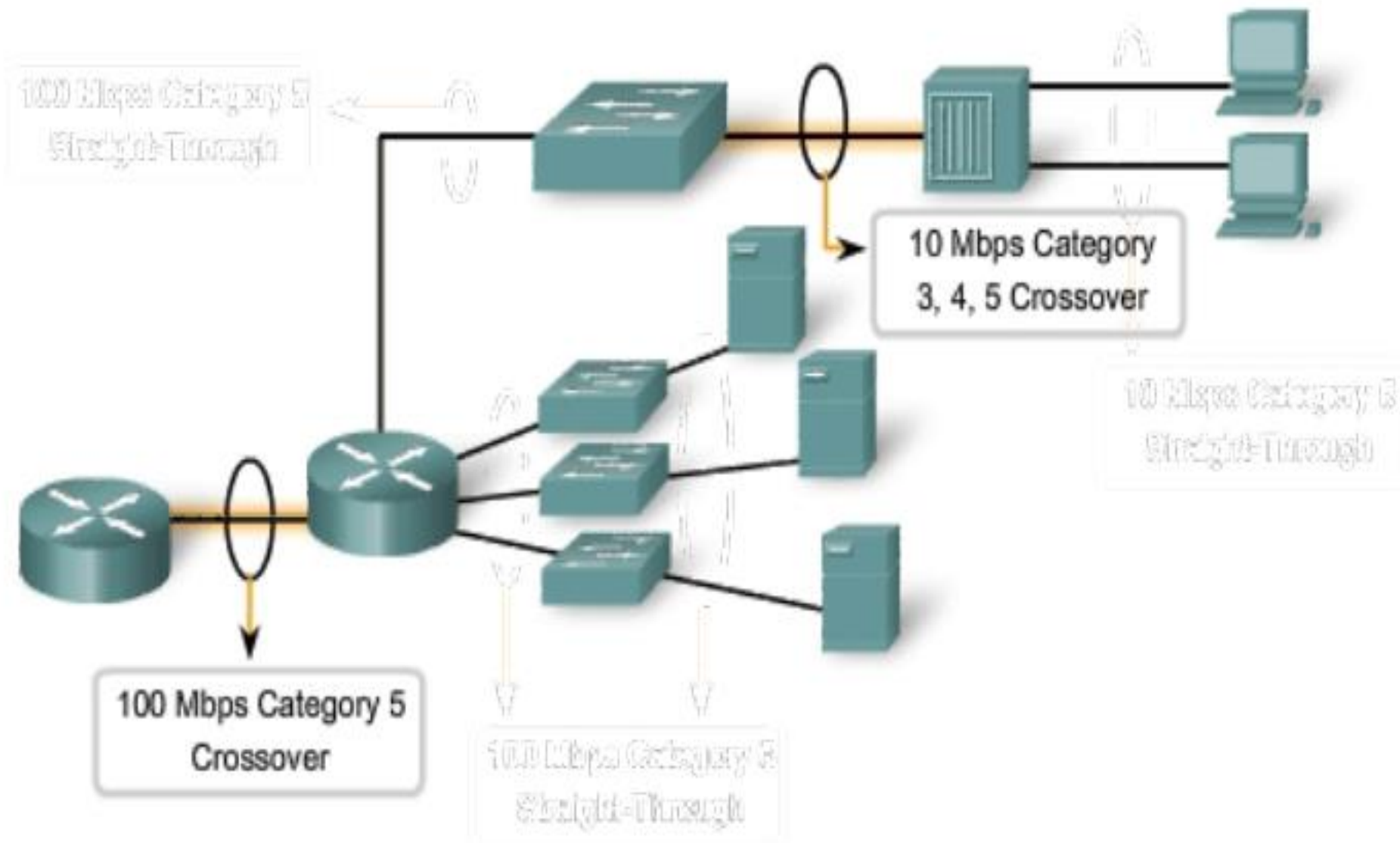
Making LAN Connections

Identify the correct UTP cable type and likely category to connect different intermediate and end devices in a LAN.

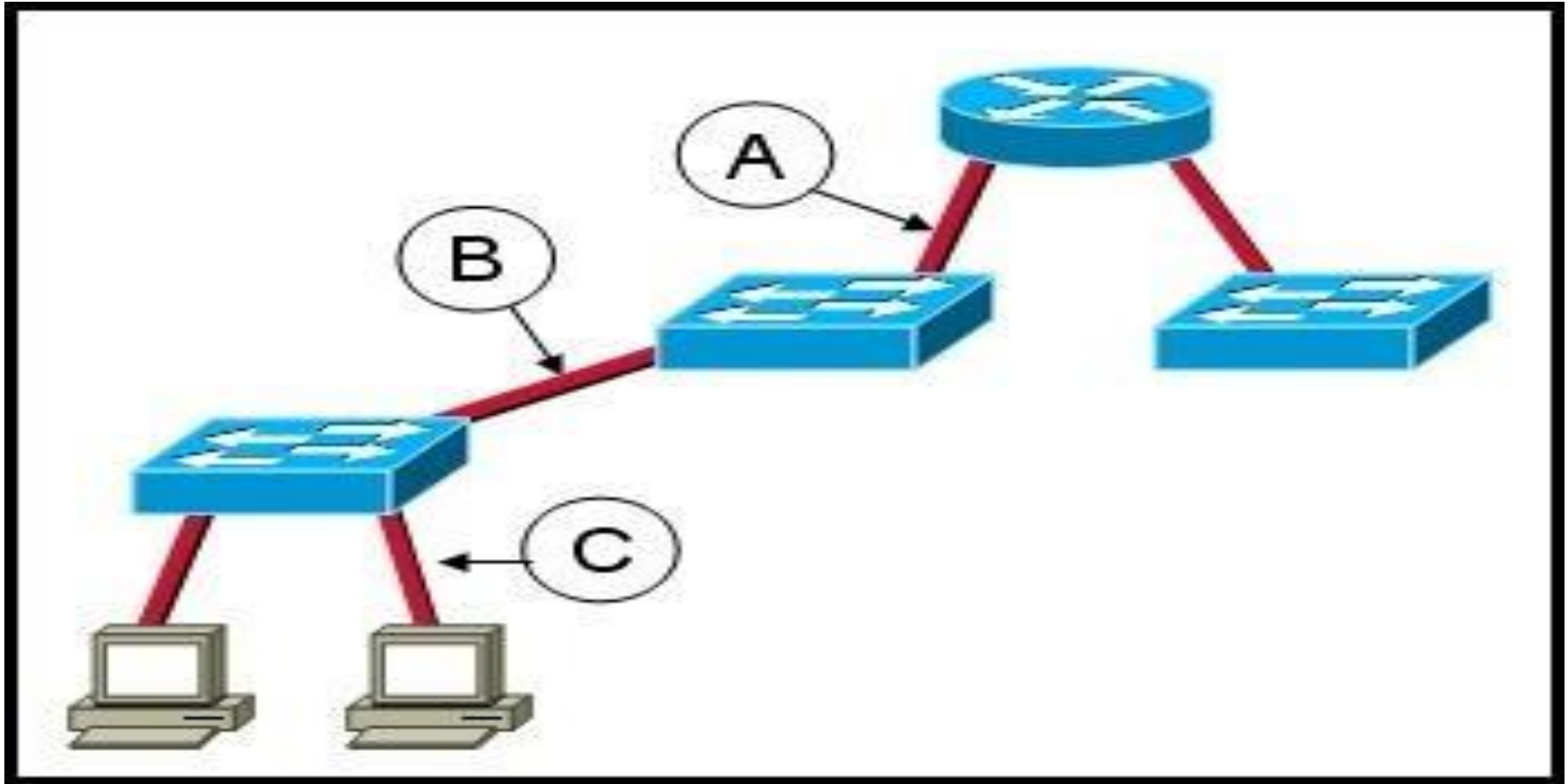


Making LAN Connections

Identify the correct UTP cable type and likely category to connect different intermediate and end devices in a LAN.

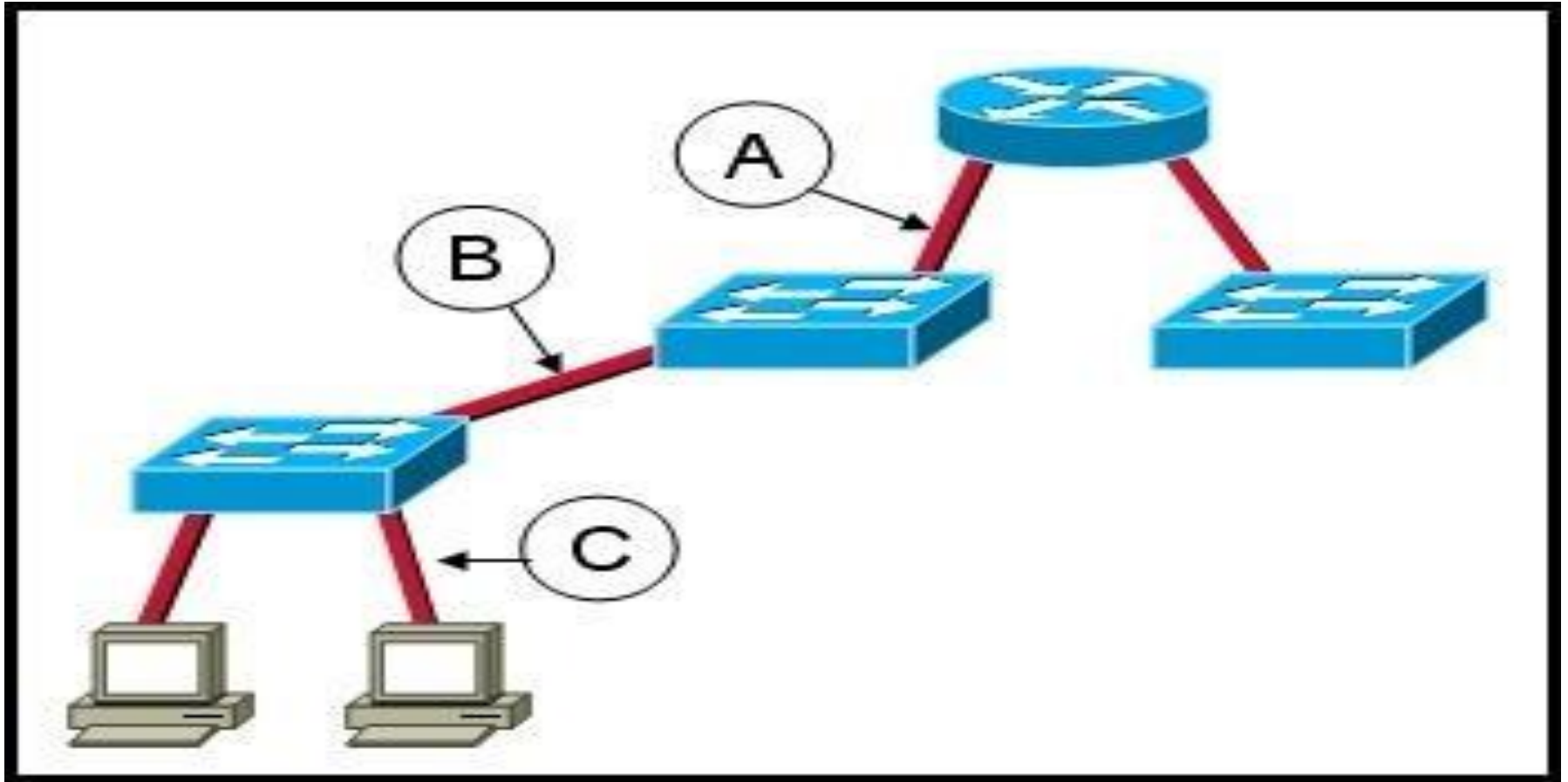


Aké typy káblov sa použijú?



A - ?, B - ?, C - ?

Aké typy káblov sa použijú?



A – straight through, , B – crossover, C - straight through

Telefónna sieť 1

- **Dial-up** je klasické vytáčané pripojenie do internetu
- Pomocou klasickej telefónnej linky a modemu
- Najlacnejšie, najstaršie, najpomalšie pripojenie
- Dosahovaná rýchlosť medzi 28kb/s-56kb/s.
- V prípade používania internetu sa nedá používať telefónna linka (nedá sa volať a ani byť volaný).

Telefónna sieť 2

- **ISDN** (Integrated Services Digital Network - Digitálna sieť integrovaných služieb),
- verejná digitálna telekomunikačná služba, navrhnutá pre komfortnú telefóniu s pridanou možnosťou dátových prenosov,
- digitálny prenos údajov po metalických vedeniach,
- potrebné mať počítač vybavený ISDN kartou alebo ISDN modemom.
(MOfdulátor/DEModulátor)

Telefónna sieť 3

- **ADSL** (Asymmetric Digital Subscriber Line)
- Jedna z foriem DSL (digitálneho účastníckeho vedenia).
- Je „asymetrická“. Pri prenose dát sa využíva vyššia prenosová rýchlosť smerom k užívateľov (pri zavádzaní dát, (download, downstream)
- Nižšia od užívateľa (pri odsúvaní dát, po angl. upload, alternatívne upstream).
- Vysokorýchlostná („širokopásmovú“) technológia, prenos dát prostredníctvom ADSL v porovnaní s prenosom analógovou prípojkou alebo základným prístupom ISDN je niekoľkonásobne vyšší.
- Umožňuje trvalý a časovo neobmedzený prenos dát nezávisle spolu s telefónnou hlasovou službou

Az ADSL működésének jellemzői/ötletei

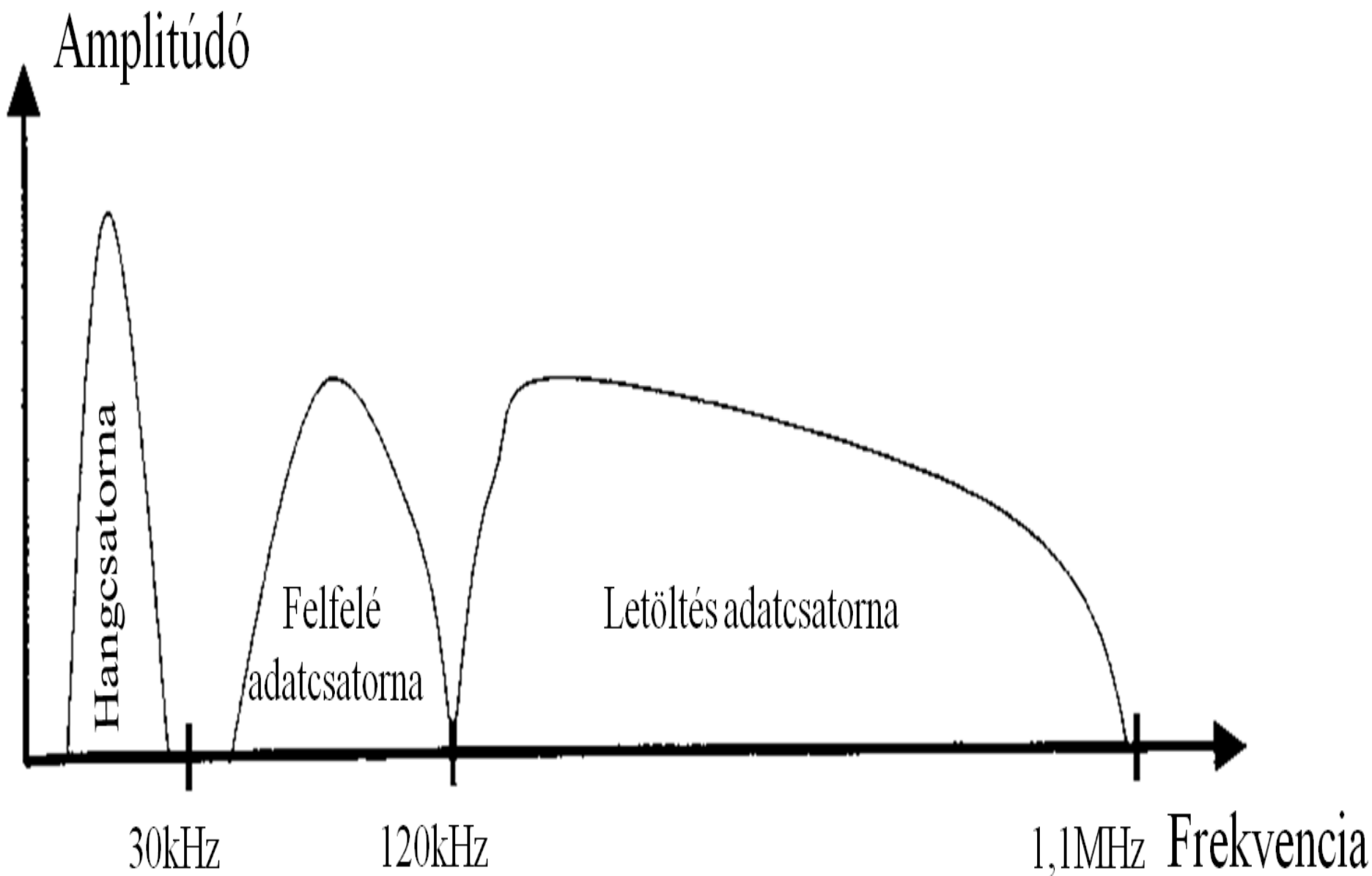
A felhasználók nagytömegű letöltéséhez nagy(obb) sávszélesség szükséges. A (várhatóan lényegesen kisebb mennyiségű) adatfeltöltéshez kisebb sávszélesség is elegendő. Ennek következtében a rendelkezésre álló sávszélességet (frekvenciatartományt) aszimmetrikus módon célszerű felosztani.

Az ADSL működésének jellemzői/ötletei

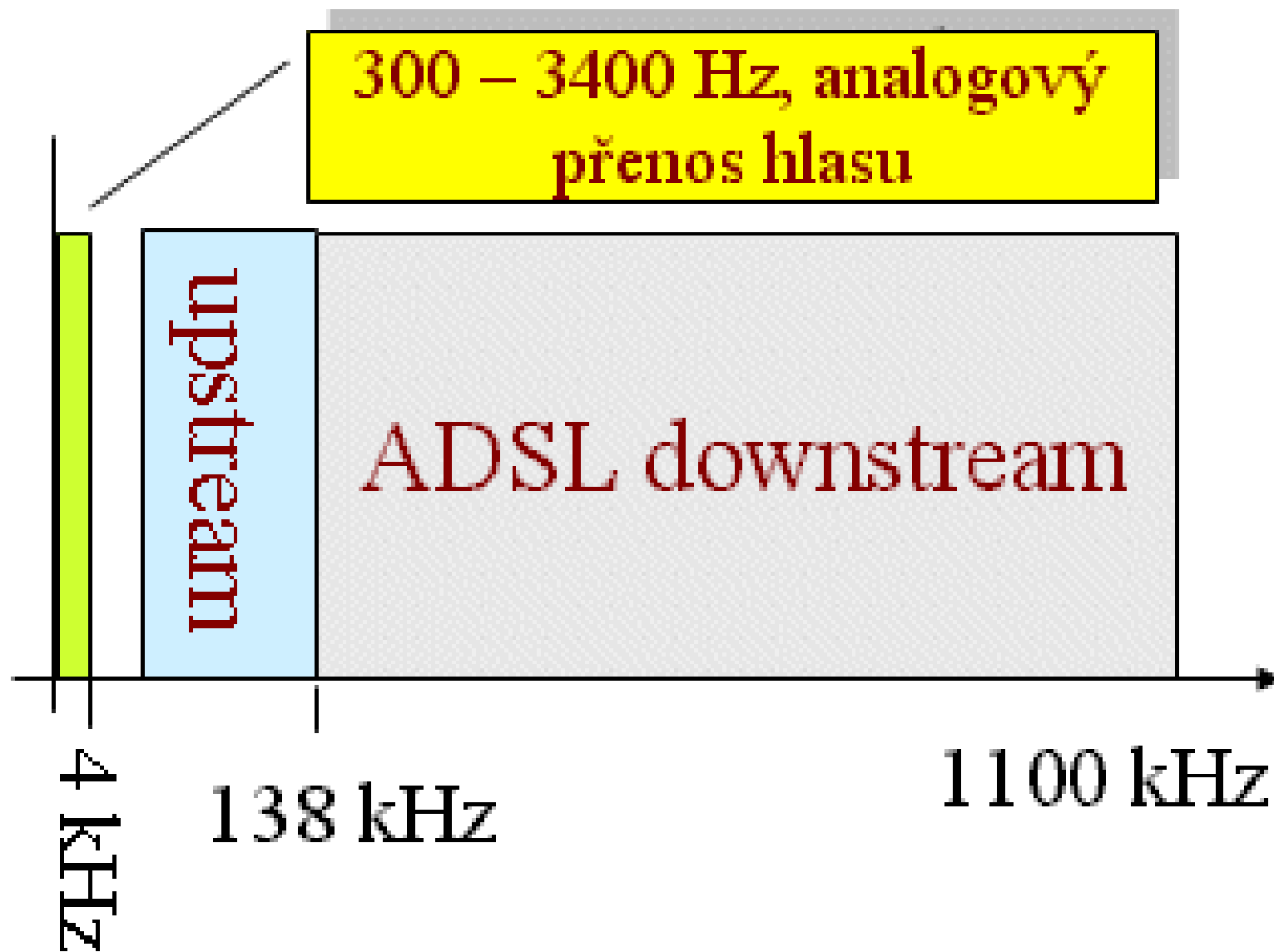
A telefonos technológiában a végfelhasználók csatlakoztatására használatos réz érpár már lehetővé teszi 1-2MHz-es sáv szélesség használatát km nagyságrendű távolságra, így ez már a gyakorlatban is alkalmazható telefonvezetéken kialakítandó nagysebességű kapcsolat létrehozására.

ADSL frekvenciatartományok

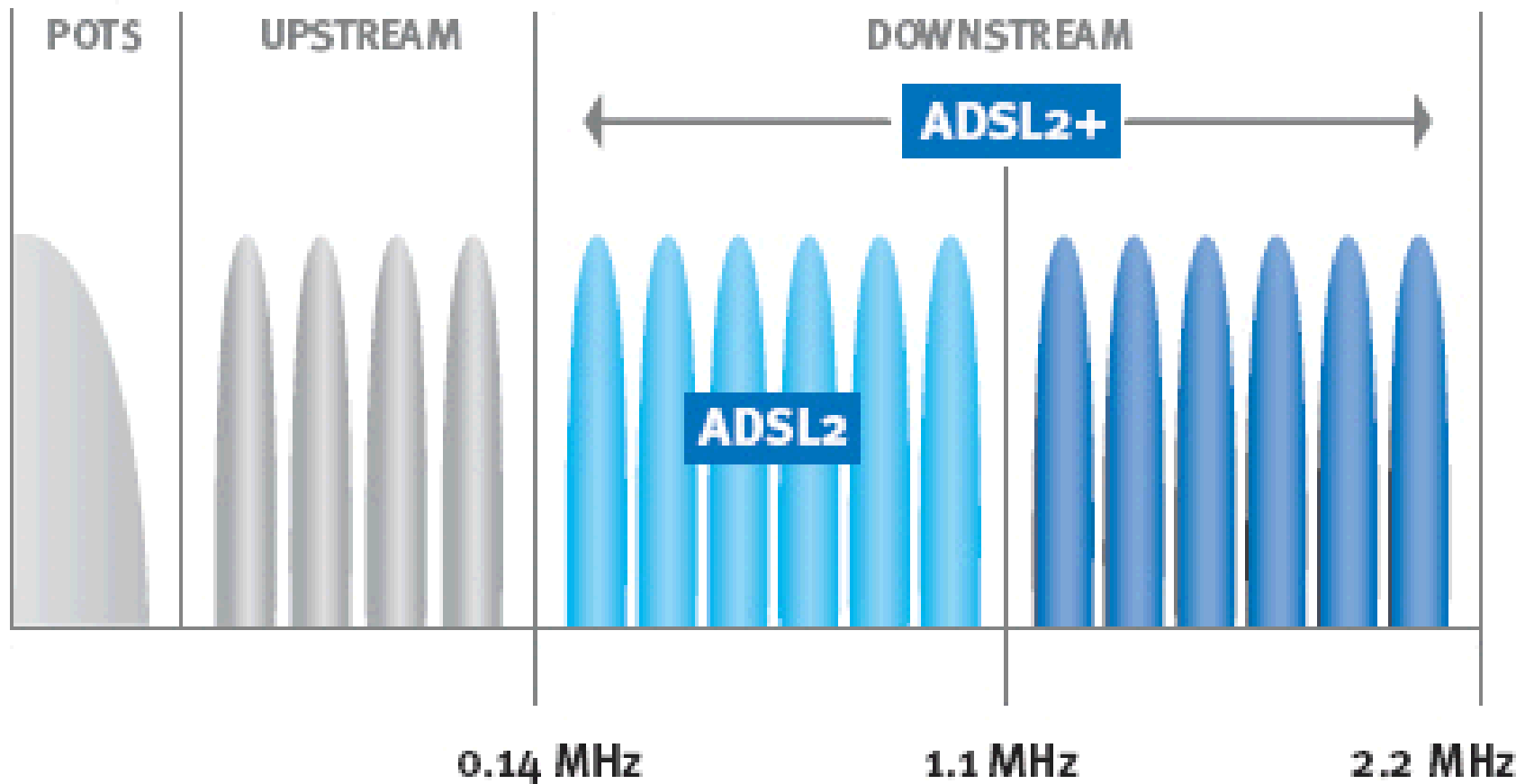
Az ADSL alapvetően FDM alapon osztja fel a csatornát a három kommunikációs cél (hang, adatfeltöltés, adatletöltés) között. A telefonos hangkommunikáció számára néhány kHz sáv szélesség szükséges, erre a célra foglalják le az alsó ~30 kHz-es tartományt. A következő ~80 kHz-es tartományt az adatfeltöltési célra alkalmazzák. A megmaradó ~1000 kHz-es tartomány pedig az adatletöltési célt szolgálja (lásd a következő ábrát).



ADSL frekvenciatartományok



ADSL2+



ADSL2 a ADSL2+

Rýchlosť ADSL2 a ADSL2+ **je zhodná** ak sú vzdialenosti väčšie ako 2,5 km. Pri menších vzdialenostiach je rýchlosť ADSL2+ dvojnásobná. ADSL2+ tiež dovoľuje využívať dva a viac párov – vedení. Tým sa dosahuje ďalšieho prudkého nárastu rýchlosti. Vďaka týmto štandardom je možné dosah ADSL pripojenia **zväčšiť až na 7 km.**

ADSL2 és ADSL2+

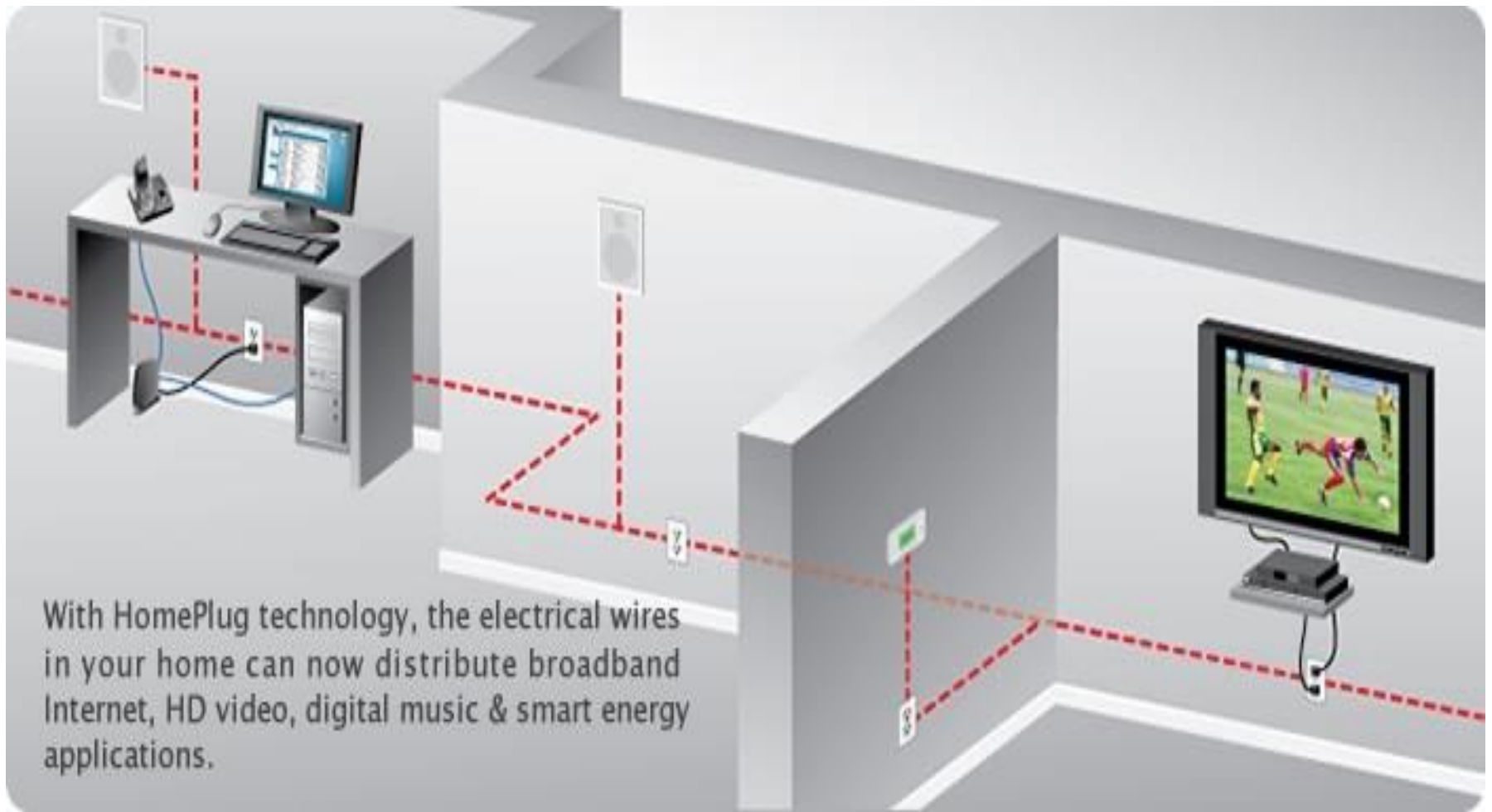
Az ADSL2 és ADSL2+ átviteli sebessége **azonos** ha távolság nagyobb mint 2,5 km. Kisebb távolságoknál a **kétszerese**. Az ADSL2+ lehetővé teszi a két vagy több érpárú vezeték használatát. Ezzel lényeges sebességnövelés érhető el. Ezzel a szabványbővítéssel elérhető az ADSL csatlakozások 7 km kiterjesztésére.

Elektrická sieť 1

- **DPL** (Digital Power Line – digitálne silové vedenie) je sieťová technológia využívajúca elektrické rozvody.
- Pripojenia internetu priamo od elektrárne až do elektrickej zásuvky.
- Problémom je prenos vysokofrekvenčného signálu cez transformátory na vysokonapäťovom vedení.
- Internet privedený za posledný transformátor smerom k užívateľom inou cestou, ako po elektrickom vedení.

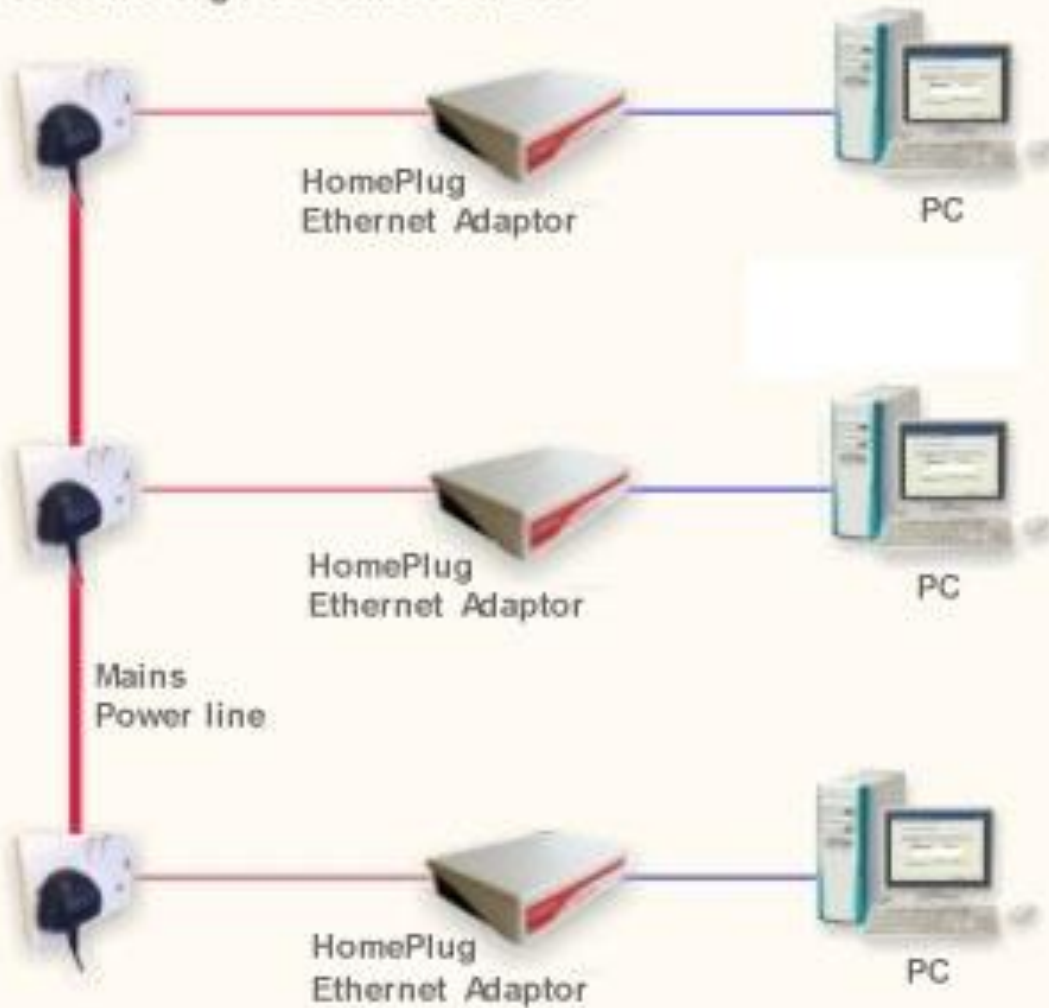
Elektrická sieť 2

- **Home Plug** („elektrická zástrčka v domácnosti“)
- používa sa k prepojeniu počítačov v budove cez elektrické rozvody 230V;
- do elektrickej zásuvky sa zasunie adaptér HomePlug a k počítaču sa pripojí káblom USB alebo ethernetovým káblom; prenosové rýchlosti dnes sú stovky Mbps;

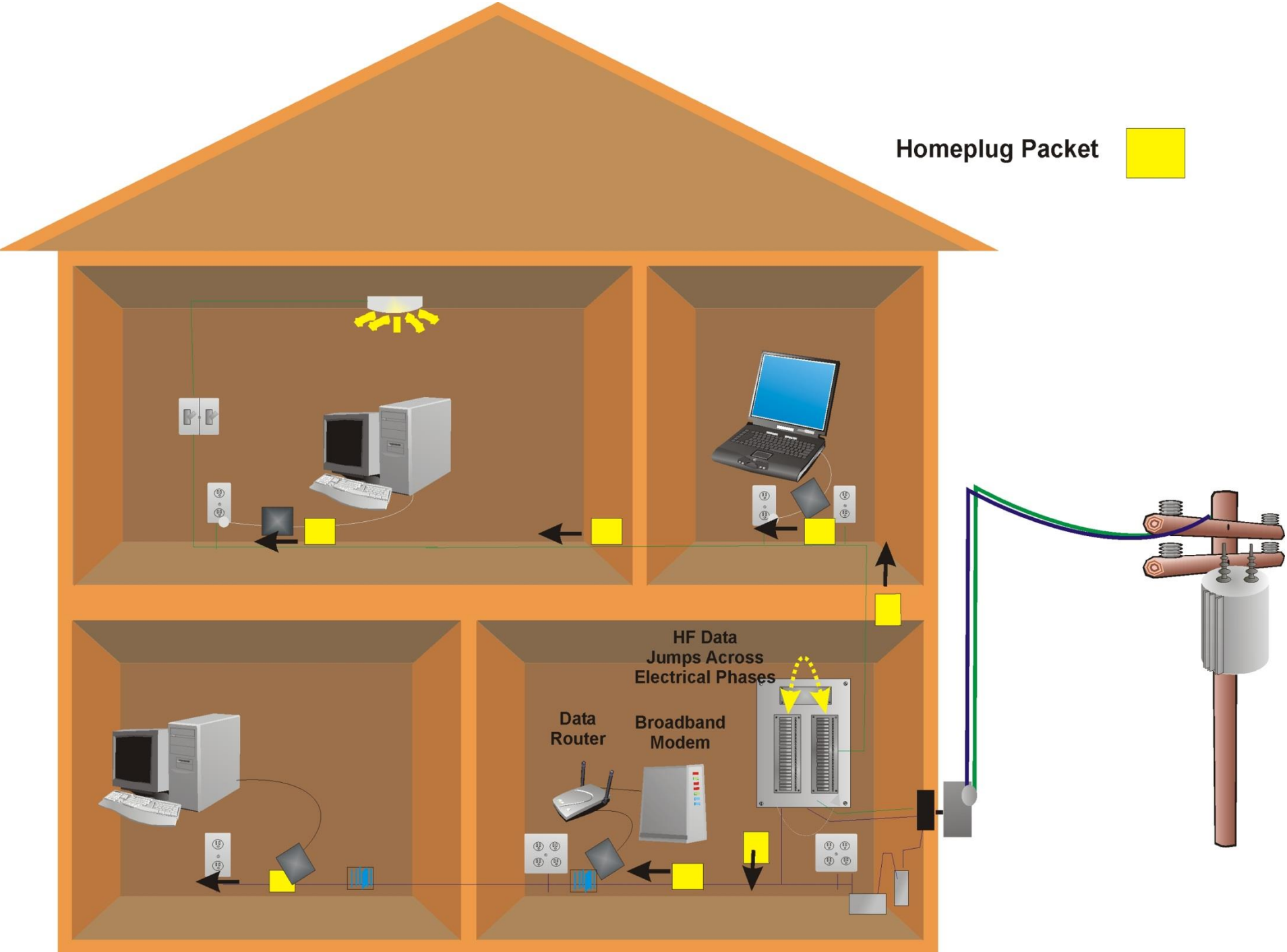


With HomePlug technology, the electrical wires in your home can now distribute broadband Internet, HD video, digital music & smart energy applications.

A HomePlug Powerline Network

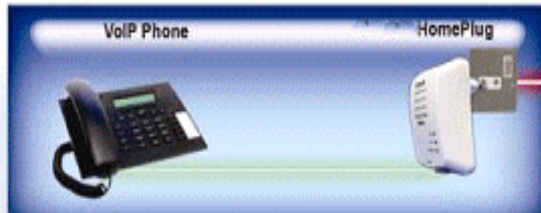


Homeplug Packet



HomePlug Applications

VoIP Phone access for rooms without Cable/Tel point



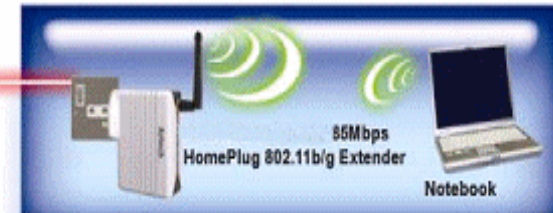
Broadband TV (IPTV)



Broadband Sharing



Wireless Extender



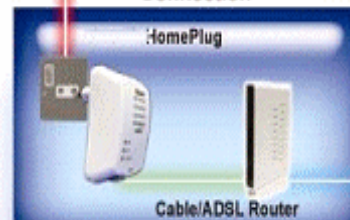
Online Gaming



Network Camera

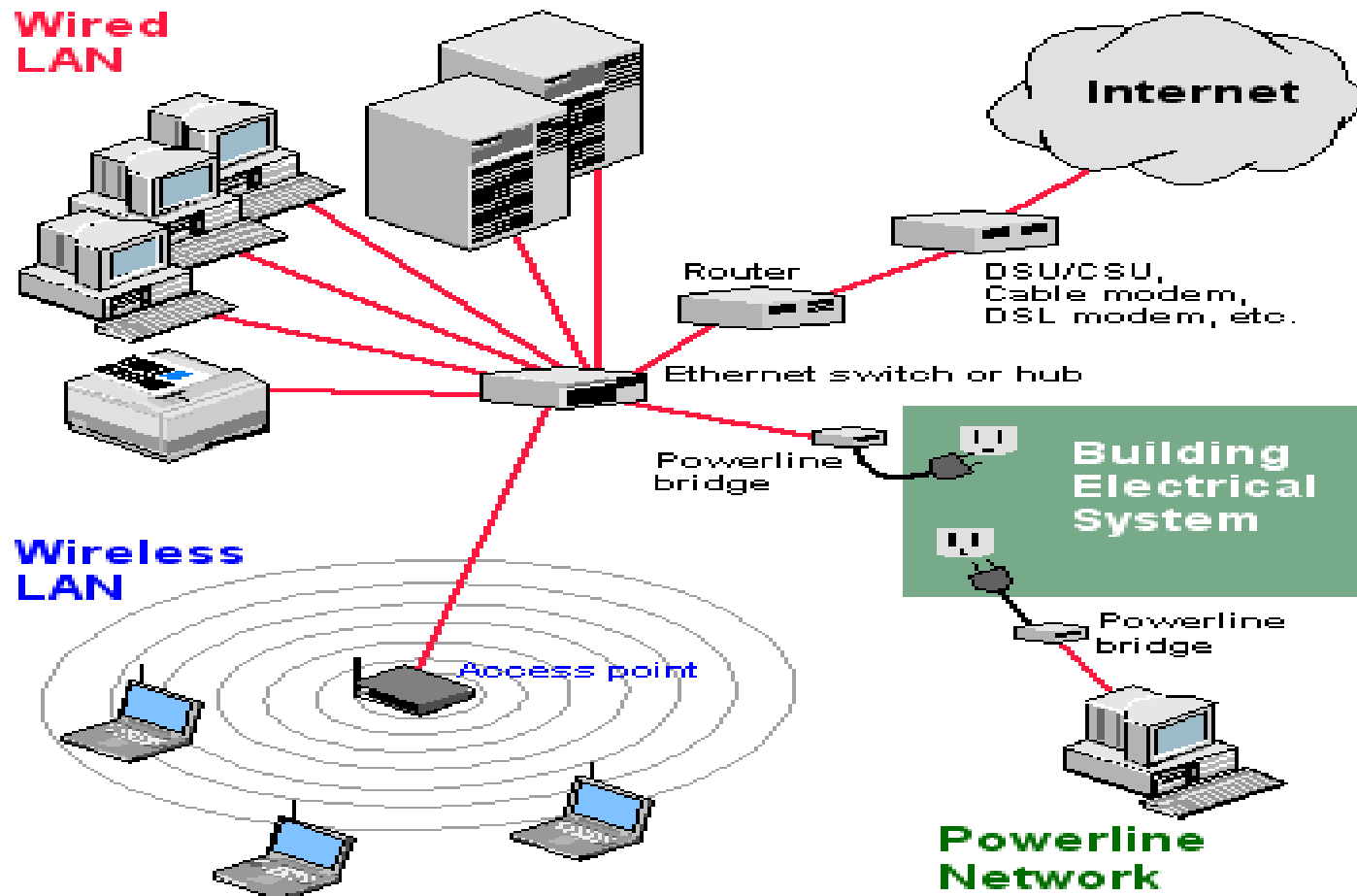


ADSL/Cable Broadband Connection

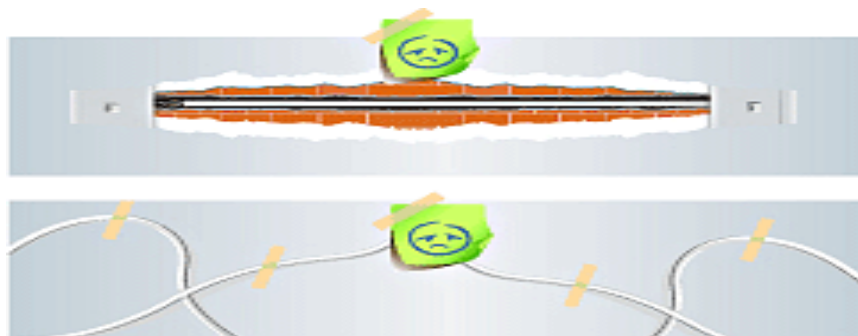
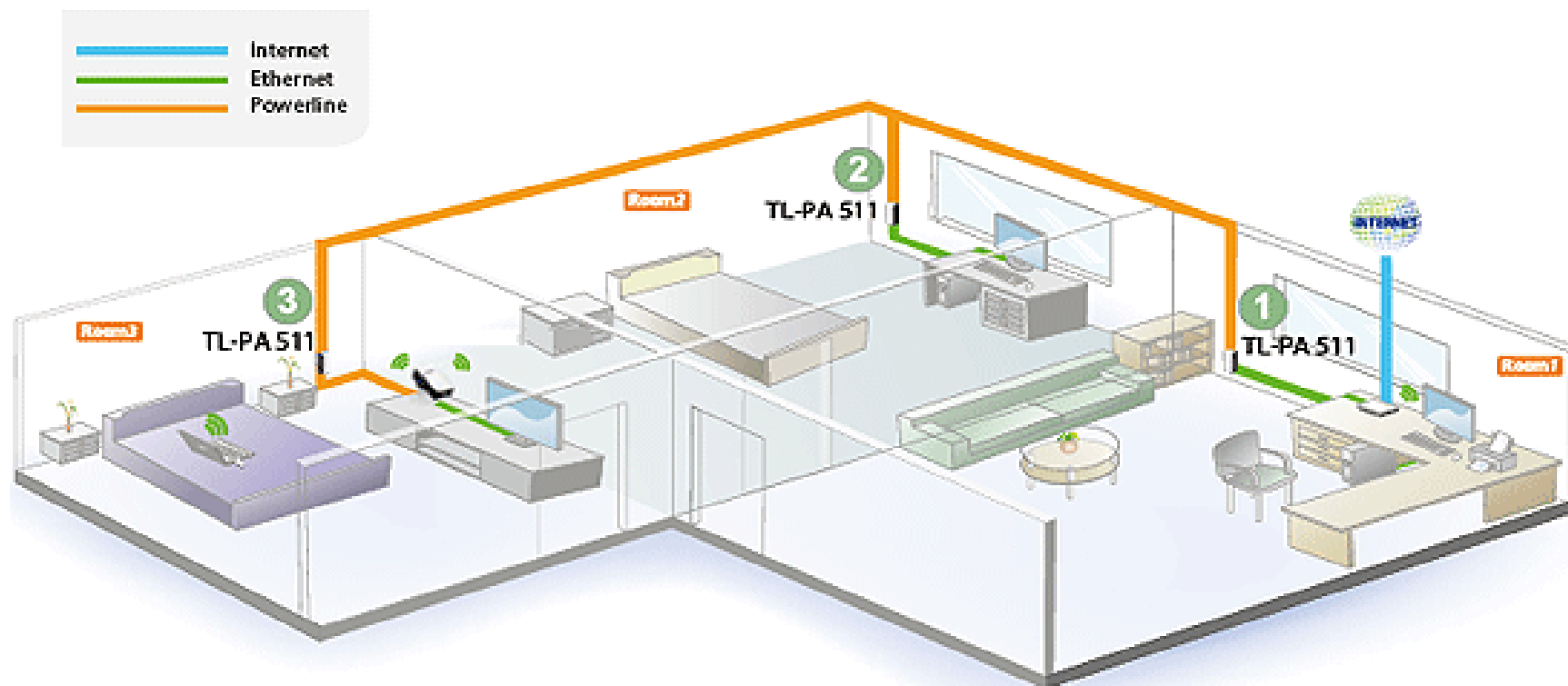


Internet





© Diagram:





Various type of
HomePlug adapters