Researchers say data transmission rate of copper cables be increased

Topic Name: Researchers say data transmission rate of copper cables be increased

Category: Electrical

Research persons: Professor Mohsen Kavehrad

Location: Pennsylvania State University, United States

Details

You may not be able to get blood out of a turnip, but according to Penn State engineers, you can increase the data transmission of Category-7 copper cables used to connect computers to each other and the Internet.

"Working with NEXANS, the company that manufactures the cable, we have examined the possibility of sending digital data at a rate of 100 gig second over 100 meters of Category-7 copper cable," says Mohsen Kavehrad, the W.L. Weiss Endowed Chair professor of electrical engineeri "These are the current, new generation of Ethernet cables."

These cables are used to connect computers within a room or a building or to create parallel computing systems.

While the long distance lines of most Internet systems are glass fiber optic cables, which are very fast, copper cable is generally used for short distances.

"In home networks, for example, it is expensive to use fiber optic cabling," says Ali Enteshari, graduate student in electrical engineering who pr the team's methods to the IEEE High Speed Study Group in Atlanta.

All transmission cables are limited by the distance they can transmit data without degradation of the signal. Before errors and interference mak signals non-recoverable, cable systems use repeaters which are similar to computer modems to capture, correct or recover data, and rese distance between repeaters depends on the cable and the approach used by the modem to correct errors.

"What we are offering is a less expensive solution and one that is easier to build," says Jarir Fadlullah, graduate student in electrical engineerin

Using information on specifications and characteristics of the cables from NEXANS, the researchers modeled the cable with all its attributes inc modeling crosstalk. They then designed a transmitter/receiver equipped with an interference canceller that could transfer up to 100 gigabits usi correcting and equalizing approaches. Ethernet cable like the Category 7 is made up of four pairs of twisted wires shielded to reduce crosstalk. Category 7 is heavier weight wire with better shielding than Category 5 cable. Kavehrad's group did similar analysis on the Category 5 cables i

"A rate of 100 gigabit over 70 meters is definitely possible, and we are working on extending that to 100 meters, or about 328 feet," says Entesh "However, the design of a 100 gigabit modem might not be physically realizable at this time as it is technology limited. We are providing a roadm design a high speed modem for 100 gigabits."

The researchers believe that two or three generations in the future, the technology of chip circuitry will allow these modem designs to be built. C chip design is at about 65 nanometers, but they expect in the next two generations to get to what is required, says Kavehrad.

The amount of data encompassed by 100 gigabits is amazing. The entire Encyclopedia Britannica contains 1 gigabyte of information. A byte is equivalent to 8 bits, so 1 Gigabyte is equal to 8 gigabits. A rate of 100 gigabits per second over 100 meters is the transmission of 12.5 Encyclop Britannica sets per second.

Note for Data transmission

Data transmission is the conveyance of any kind of information from one space to another. Historically this could be done by courier, a chain of or semaphores, and later by Morse code over copper wires.
In recent computer terms, it means sending a stream of bits or bytes from one location to another using any number of technologies, such as c wire, optical fiber, laser, radio, or infra-red light. Practical examples include moving data from one storage device to another and accessing a w which involves data transfer from web servers to a user's browser.
A related concept to data transmission is the data transmission protocol used to make the data transfer legible. Current protocols favor packet l communication.

Note for Category 7 cable

Category 7 cable (CAT7), (ISO/IEC 11801:2002 category 7/class F), is a cable standard for Ethernet and other interconnect technologies that c made to be backwards compatible with traditional CAT5 and CAT6 Ethernet cable. CAT7 features even more strict specifications for crosstalk a system noise than CAT6. To achieve this, shielding has been added for individual wire pairs and the cable as a whole.
The CAT7 cable standard has been created to allow 10 gigabit Ethernet over 100 m of copper cabling. The cable contains four twisted copper w pairs, just like the earlier standards. CAT7 can be terminated either with RJ-45 compatible GG45 electrical connectors which incorporate the RJ standard or with TERA connectors. When combined with GG-45 or TERA connectors, CAT7 cable is rated for transmission frequencies of up to MHz.

About Researcher

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Dr. Kavehrad's research contributions have been in the fields of: Satellite communications, Fixed radio communications, Portable and Mobile ra communications, Atmospheric Laser communications, Fiber optic communications and fiber optic networks. His current research interests are i areas of technologies, systems, and network architectures that enable the vision of the information age; e.g., Broadband Wireless Communicat Networked Systems and Optical Communications Networked Systems. Since the start of his academic career, these research topics and other led to significant graduate research. He has supervised to completion several doctoral dissertations and all his students hold positions in the to and academia. He was elected a Fellow of the IEEE in January 1992 for his contributions to Digital Wireless Communications and Optical Fibe Systems and Networks. He received 3 Exceptional Technical Contributions awards while working at Bell Laboratories for his works on Wireless Communications Systems, the 1990 TRIO Feedback award for his patent on a "Passive Optical Interconnect" and the IEEE VTS Neal Shepher propagation paper award and 3 IEEE Lasers and Electro-Optics Society best paper awards and a Canada NSERC PhD-thesis gold medal awa with his former graduate students for their works on wireless and optical systems.

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