

NEWS and DS	s the difference between Cable SL broadband access ? Part 2	KTSM-TV
Major technological differences produce re	oughly equivalent Internet performance	KVIA-TV
Feb.2013/ Lou Frenzel/ <i>Electronic design</i>	oughly oquivalent internet performance	KRWG-TV
DSL	rates than longer runs. But despite this limitation, de- velopments in digital signal processing have made this	KBNA-AM/FM & KAMA-AM
DSL is one of the oldest forms of high-speed Internet access. It had its start in the 1990s and has since evolved into a very stable and capable platform. It uses	once limited communications medium capable of high- speed data delivery. The telephone companies (telcos) have upgraded this	KHEY-AM/FM, KPRR-FM & KTSM-AM/FM
existing telephone wiring, generally known as the plain old telephone system (POTS). The in-place unshielded twisted pair (UTP) telephone lines form the backbone	basic system to include neighborhood terminals called digital subscriber line access multiplexers (DSLAMs). The DSLAM shortens the distance from the subscriber	KLAQ-FM, KISS-FM & KROD-AM
of the legacy wired telephone system. Thanks to techno- logical developments, this wiring that was installed to handle voice telephone calls can now deliver high-speed	to the central office, so much higher speeds can be de- livered. For shorter cable runs, the DSLAM may be in the central office. The DSLAM aggregates the data from	KPAS-FM- ALGIE A. FELDER CSBE
digital data at 50-Mbit/s rates and beyond in some cases. In a typical system, the telephone central office is con-	multiple subscribers and connects them back to the central office by fiber-optic cables. This arrangement is generally known as fiber to the node (FTTN). Older	KINT98.COM INTERNET RADIO NETWORK
nected to each subscriber by one or more #24 or #26 copper wire unshielded twisted pairs, with one for each telephone number. The lines are not shared. The cable	systems used T1 or T3 lines, but today most DSLAM connections are fiber. On the consumer end of the telephone line is a DSL	BURST COMMUNICATIONS INC KIRK BASEFSKY
runs vary from a few hundred feet to a maximum of 9000 to 18,000 feet (2.7 to 5.5 km). The system was designed to carry voice in the 0- to 4-kHz range. Farly	modem generally called the customer premise equip- ment (CPE) that is used to demodulate the signals from the DSLAM and modulate any unstream transmissions	GIESLER BROADCASTING SUPPLY INC.
in the Internet era, dialup modems were designed to carry digital data over these analog lines. Special QAM	A low-pass filter separates the o- to 4-kHz voice spec- trum from the higher frequencies used for data trans-	ENTRAVISION COMMUNICATIONS
carried at rates to about 56 kbits/s maximum. Then the DSL system was developed to carry much higher	Most DSL systems use a modulation scheme similar to orthogonal frequency division multiplexing (OFDM)	SCMS, INC
speeds. The original DSL system was designed to produce data	called discrete multitone (DMT). It divides the cable spectrum into subchannels or bins that are 4.3125 kHz	ABS ADVANCED BROADCAST SERVICES, LLC
telephone company to the subscriber and a lower rate upstream. Most Internet access involves more	VDSL2 downstream	KSCE-TV
downloading and less uploading of data. The resulting design is referred to as asymmetrical DSL or ADSL.	ADSL2 downstream downstream	RF Specialties of lexas Dan Sessler.
Most DSL formats are asymmetrical, although there are DSL variations that deliver the same rates in both di- rections		KCOS-TV
The great attenuation, noise, and crosstalk problems of bundling multiple twisted-pair lines are the primary	0 26 MHz 138 MHz 1.1 MHz 2.2 MHz 55 8.8 MHz 57 30 MHz 4 kHz 4.3125-kHz	KELP-AM ARNOLD McClatchy.
limitations of the POTS. These lines are effectively long low-pass filters with upper frequency limits that reduce the bandwidth of the line and limit the data rate that	wide subcorriers	MARSAND, INC.
can be achieved. Line bandwidth is a function of the length of the UTP. Shorter cable runs have wider band- widths, so they are clearly more capable of high data	4. This is the spectrum of the unshielded twisted-pair cable showing the subcarriers and the upstream and down- stream allocations for ADSL, ADSL2, VDSL, and VDSL2.	Ho Tah Say. LLC













The original basic DSL uses 256 subchannels for a bandwidth of 1.1 MHz. The lower subchannels from approximately 26 kHz to 138 kHz are used for upstream transmissions from the subscriber to the central office. Above 138 kHz to about 1.1 MHz are the subchannels used for downstream transmission.

As in OFDM, the high-speed serial data to be transmitted is divided into many slower parallel streams, each of which modulates a subcarrier in each subchannel. Modulation can be from QPSK to 64QAM. In DSL, the maximum bit rate per carrier is 60 kbits/s. The modulation is accomplished digitally in a digital signal processor (DSP) using the inverse fast Fourier transform (IFFT) for modulation and FFT for demodulation.

The actual data rate depends not only on the modulation method used but also on the number of subchannels used-and, of course, the distance between the central office or DSLAM and the CPE. Noise is another limiting factor. The DSLAM and DSL modem can adapt to noise conditions by examining the spectrum and blocking channels with excessive noise content. This reduces the speed but maintains the link with accurate data. There are many different versions. ADSL is the most common, although some newer and more advanced versions are widely used. For example, ADSL2 extends the line bandwidth to 2.2 MHz and 512 subchannels, extending the maximum data rate to 12 Mbits/s. Another variation, ADSL2+, further extends the maximum rate to 24 Mbits/s. Then there is video DSL (VDSL). Designed to carry compressed digital video for HDTV, it achieves even higher rates by using more of the cable bandwidth and further restricting its length. There are multiple versions including VDSL2 with a variety of specifications.

One version uses the UTP cable bandwidth out to 8.832 MHz with 2048 subcarriers to achieve a maximum rate of 50 Mbits/s. Other versions use 12, 17, or 30 MHz of bandwidth. With the 17-MHz bandwdith and 4096 subcarriers, the maximum possible data rate is 100 Mbits/s. Another version uses 30 MHz of bandwidth with 3479 subchannels that are 8.625 kHz wide instead of the usual 4.3125 kHz. Maximum data rate is 200 Mbits/s. The range is usually restricted to 1000 to 3000 feet. Unlike cable TV connections, DSL gives the full speed to each user.

To make VDSL2 even faster, companies like Broadcom, Ikanos, and Lantiq are implementing VDSL2 chips with a feature called vectoring. This digital signal processing technique cancels noise and farend crosstalk (FEXT) between bundled twisted pairs, enabling high speeds. These new chips also implement channel bonding that permits two twisted pairs to be used simultaneously to further increase speed to 200 Mbits/s downstream and 100 Mbits/s upstream. For example, the Ikanos' Vx185-HP

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EL PASO, TX SBE CHAPTER 38 MEETING MINUTE

DATE 11/14/2017 LOCATION: COMO'S Italian restaurant

MEETING CALLED TO ORDER: 12:25 PM, BY ANTONIO CASTRO. THERE WERE 10 ATTENDANTS.

REPORT OF THE SECRETARY: MINUTES IN THE NOVEMBER NEWS-LETTER. ACCEPTED BY WARREN REEVES, SECONDED BY GLENN LEFFLER.

REPORT OF THE TREASURER: \$ 3,016.72 IN THE BANK. ACCEPTED BY NORBERT MILES, SECONDED BY MARIO JIMENEZ.

REPORT OF THE CERTIFICATION COMMITTEE: NO REPORT.

REPORT OF THE MEMBERSHIP COMMITTEE: NO REPORT.

REPORT OF THE FREQUENCY COORDINATOR COMMITTEE: WAR-REN MENTIONED APPLICATION FOR WIRELESS MIC USAGE WILL NOT INTERFERE BECAUSE OF THE LOW POWER OF 4 mW

REPORT OF THE SCHOLARSHIP COMMITTEE: NO REPORT.

REPORT OF THE WEBSITE COMMITTEE: 2258 HITS LAST TIME, NOW 2275. (17).

REPORT OF THE EAS CHAIRMAN: MONTHLY TEST FOR TX WAS FINE. NM WAS NOT FORWARDED DUE TO OUTAGE OF INTERNET SERVICE AT KLAQ. LP-1S SPANISH RELAY TO BE SUBMITED AND UPDATED.

REPORT OF THE PROGRAM COMMITTEE: POSSIBLE PRESENTATION OF LIVEU.TV FOR DECEMBER 19. TO BE CONFIRMED.

UNFINISHED BUSINESS: NONE.

NEW BUSINESS OR ANY ITEMS FOR THE CHAPTER INTERES: VOTED NOT TO HAVE ENNES WORKSHOP FOR 2018..

NEXT MEETING DATE AND LOCATION: DECEMBER 19, 2017, TIME:11:30, PLACE: RIO CHINA BUFFET, SUNLAND PARK

MEETING ADJOURNED: AT 13:00 PM.

LET'S HAVE A WONDERFUL DECEMBER HOLIDAYS.

BEST WISHES FOR EVERYONE AND HAVE A GREAT NEW YEAR 2018

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THERE WAS NO PRESENTATION FOR THE MONTH OF NOVEMBER, JUST OUR REGULAR CHAPTER MEETING.

FOR DECEMBER, ON THE 19TH, THE MEETING AND PRESENTATION WILL BE HELD AT THE "RIO CHINA BUFFET, 655-A SUNLAND PARK DRIVE, EL PASO TX.

THIS TIME WE'L MEET A BIT EARLIER SO WE CAN HAVE ENOUGH TIME FOR THE SHOW.

ARCO GROENENBERG, DIRECTOR OF SALES FOR LiveU, Inc. IS COMING TO EL PASO AND WILL HOST THE LUNCH/ PRESENTATION.

WHEN: TUESDAY DECEMBER 19th.

PLACE: RIO CHINA BUFFET.

TIME: START AT 11:30 AM.

LET'S MEET, EAT AND ENJOY THE LIVEU PRESENTATION.



communications processor chipset implements VDSL2 as well as vectoring and channel bonding in a home gateway (Fig. 5).



5. The Ikanos Fusiv Vx185-HP home gateway chip implements ADSL2 and VDSL2. A MIPS 600-MHz processor is the host. Interfaces include two 1-Gbit/s Ethernet ports, PCI Express, USB 2.0, SATA, and the usual UART, SPI, I²C, and GPIO ports. VoIP processing is included.

AT&T's popular U-verse system uses VDSL2. It sends video signals by fiber to a neighborhood DSLAM and then distributes the signal to homes over the installed UTP wiring. The U-verse system provides cable TV-like service with IPTV as well as VoIP and Internet access. The International Telecommunications Union-Telecommunications (ITU-T) standardizes DSL specifications. The ADSL standard is G.991 and G.992. The ADSL2 standard is G.993 and G.994. ADSL2+ is specified in G.995. The standards G.993.1 and G.992 define VDSL and VDSL2. The vectoring standard is G.993-5, and the channel bonding standard is G.998.1.

Alternate Systems

Most consumers use cable TV or DSL for Internet service. However, there are instances where other methods are desirable or necessary. In many areas where new homes are being built, installing fiber-optic cable directly to the home (FTTH) is no more expensive. For example, Verizon's FIOS system isn't widely available but does provide services with typical rates from 50 to 100 Mbits/s.

Some rural systems use wireless methods. Clearwire's system uses the WiMAX standard (IEEE 802.16) to deliver data rates from 1 to 5 Mbits/s over several miles. For even more remote service, a few companies offer satellite downstream data at rates to several megabits per second.