Chapter 38 of the Society of Broadcast Engineers
SBE
EL PASO - LAS CRUCES - JUAREZ

FEBRUARY 2016

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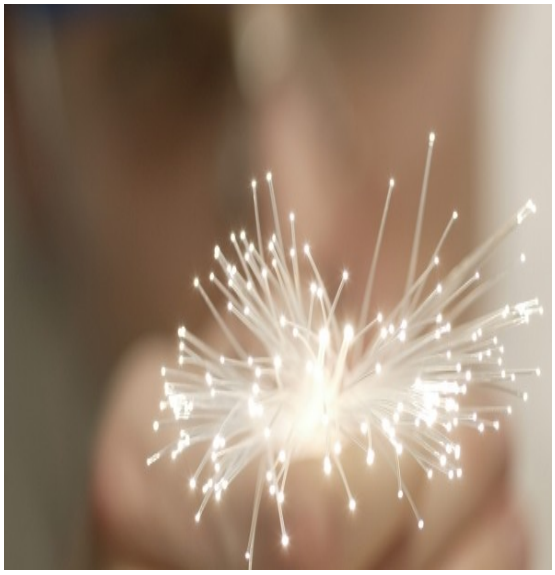
NEWS

POWER AND DATA OVER FIBER OPTICS? LET'S SEE!

Fiber Optics Transmit Data and Power Over Same Cable

Jan 29, 2016 **James Morra** | ***Electronic Design***



A research team from the University of Electro-Communications has invented a new fiber optic system that transmits both data and power over the same cable. (Image courtesy of Thinkstock).

In the latest attempt to confront the growing power demands of wireless communications, a research team from the University of Electro-Communications in Japan has invented a fiber optic system that transmits both data and power over the same cable.

The research team, led by Motoharu Matsuura, has shown that the new system is capable of sending up to 60 watts over a distance of 300 meters. The researchers suggest that the fiber optic cable would be ideal for the growing infrastructure behind small cells—low-power, short-range radio terminals that backhaul data from the edge of a wireless network.

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In recent years, fiber optic power cables have been the subject of quiet but hard-nosed research, but most systems developed so far transmit little power. In 2012, scientists from Sandia National Laboratories in New Mexico invented one of the earliest power-over-fiber systems, using laser diodes on one end of the cable and a miniature photovoltaic cell on the other end. However, the scientists acknowledged

(Continued on page 2)

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(Continued from page 1)

the system's limitations, saying that it could only power the fiber's internal electronics. At the time, the researchers were also adding the capability to send power externally into low-power sensors and control systems.

Last year, Matsuura and his research set out to design a system that could effectively supplement the main power delivered to small cells. As described in research published last June, the research team bundled two multimode power fibers with one multimode data fiber, fusing them into a single double-clad cable at one end. The double-clad cable, which consists of an inner core surrounded by two outer layers of optical fiber, helps to prevent crosstalk.

The team linked the cable to a central data station and a radio antenna. A laser diode created test signals to IEEE 802.11g specifications, while separate laser diodes supplied the optical power. When an amplified optical signal traveled through the cable, however, most of the power escaped as heat. Although the power output reached 40W in this initial experiment, the power efficiency was only 20%.

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EL PASO, TX SBE CHAPTER 38 MEETING MINUTE

DATE 01/12/2016 LOCATION: COMO'S ITALIAN REST.

MEETING CALLED TO ORDER: 12:30 PM, BY ANTONIO CASTRO, THERE WERE 9 MEMBERS.

REPORT OF THE SECRETARY: MINUTES IN THE JANUARY NEWS-LETTER. ACCEPTED BY MARIO JIMENEZ, SECONDED BY JUAN BARRERA.

REPORT OF THE TREASURER: $ 6,291.35 IN THE BANK. ACCEPTED BY CARLOS SOSA, SECONDED BY MARIO TELLEZ.

REPORT OF THE CERTIFICATION COMMITTEE: NO REPORT.

REPORT OF THE MEMBERSHIP COMMITTEE: NO REPORT.

REPORT OF THE FREQUENCY COORDINATOR COMMITTEE: NOR-BERT MILES REQUESTED A TEST FOR UTEP SUN BOWL, BUT THERE IS NO RECORD OF WIRELESS MIC'S. OWEN SMITH TO GET UPDATE FROM LOCAL STATIONS.

REPORT OF THE SCHOLARSHIP COMMITTEE: WARREN REEVES WIL PRESENT A CANDIDATE FOR 2016 SCHOLARSHIP..

REPORT OF THE WEBSITE COMMITTEE: 1987 HITS LAST TIME, NOW 2000. (13).

REPORT OF THE EAS CHAIRMAN: NO REPORT.

REPORT OF THE PROGRAM COMMITTEE: WARREN REEVES TO DO A PRESENTATION FOR FEBRUARY 2016.

UNFINISHED BUSINESS:

NEW BUSINESS OR ANY ITEMS FOR THE CHAPTER INTERES: SUGESTED THAT THIS YEAR ENNES WORKSHOP WILL BRING "DOLBY" AUDIO AS WELL AS ATSC 3.0

NEXT MEETING DATE AND LOCATION: FEBRUARY 9, AT 12 PM. PLACE: COMO'S ITALIAN RESTAURANT.

MEETING ADJOURNED: AT 13:10:00 PM.

MOST OF YOU HAD RECEIVED BY NOW THE INVOICES FOR **MEMBERSHIP RENEWAL**. YOU CAN BRING THE PAYMENT AT OUR NEXT CHAPTER MEETING, OR JUST MAIL IT TO THE USUAL ADDRESS.

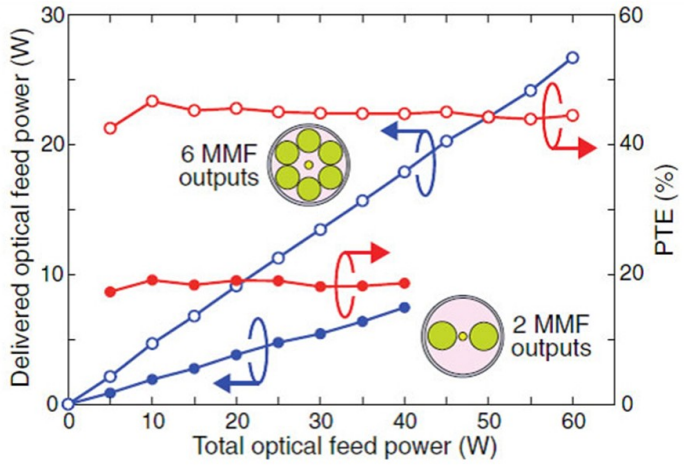
FEBRUARY PROGRAM

Our presenter for the month of January was really busy installing a LPTV some place away from Texas, so we had to have only our regular chapter meeting. It was a good start of this new year.

Unfortunately this promised presentation is going to wait for another time, because he is attending another job in the east side of the U.S.A.

In the meantime we are looking for another Alternative and you will be informed on time……and write in your calendars:

EL PASO ENNES WORKSHOP, MAY 26, 2016 THURSDAY THIS TIME !!!



This table compares the delivered optical feed power, power transmission efficiency, and total optical feed power in both designs from the University of Electro-Communications research team. (Image courtesy of University of Electro-Communications).

After these early experiments, Matsuura's research team discovered that the power efficiency was being limited by the cross-sectional area of the fibers. When bundled together, the two multimode fibers left empty space in the cable, so that their combined area was less than the area of the fused cable further down the line. The result, Matsuura said, was a very inefficient power transfer.

In the research published earlier this month, the team adjusted their design. As described in the journal *Optics Letters*, they narrowed the power-carrying fibers and increased their number to six. This helped to optimize the cross-sectional area without introducing other limitations that additional fibers might have caused.

The other benefit of the power-over-fiber system is that it protects the antenna units from unexpected breaks in the main power supply, such as a lighting strike or power surge. The point is "to maintain total electrical isolation from any stray electrical energy," says Steve Sanderson of Sandia National Laboratories.

However, optical fibers that send more power over longer distances will be required to alleviate some of the problems with small cell infrastructure. Peadar Forbes, product marketing manager for integrated transceivers at Analog Devices, says one of the problems with deploying small cells is the logistics of connecting them to a power source and fiber optic cable. While he understands the thought behind the research, he adds that a power-over-fiber cable is not a "silver bullet" for this problem.

Small cells located indoors, which typically consume between 13 and 50W depending on their capacity, already use a system that transmits power and data over the same cable: power-over-Ethernet. Because power-over-Ethernet is the de facto standard for indoor models, the power-over-fiber cable would only be suited for outdoor small cells, which Forbes says consume between 50 and 350W. Forbes adds that small cells typically have to haul data over longer distances than the 300 meter range of the new cable.