



VIA TELECOPIER AND MAIL

ING. 1900 CENTURY PARK EAST • SUITE 1617 • LOS ANGELES, CA 90067 • (213) 284-6808 • FAX (213) 284-3280

February 17, 1993

Mr. Bernard Bossard
Cellular Vision
Suite 12
Village Mall
Freehold, NJ 07728

Dear Mr. Bossard:

I am writing to you on behalf of our parent company, a large Mexican media corporation that is interested in pursuing discussions with Cellular Vision with respect to the licensing of your technology in Mexico and/or forming a joint venture. For your information, our parent company owns radio stations, television networks and various media interests in Mexico.

If you are interested, I would appreciate if you would telephone me so that we can discuss this matter. I can be reached at (310) 284-6846.

Kind regards.

Sincerely,

Pierre J. Moysset



Worldwide
Telecommunications
Solutions

Facsimile
Message

TO : Dan Reiss, Overseas Manager
CellularVision (NY)

Fax No : +1 908 462 2789

No Of Pages : 1 (Including this one)

FROM : Name : Peter Miller

Location R&D Unit

Telephone No : +61 2 287 3143

Fax No : +61 2 287 3299

Date : 17 February 1993

Time :

TEXT :

Re: Local Multipoint Distribution Service.

Dear Dan,

OTC Australia is the international trading arm of the Australian and Overseas Telecommunications Corporation. We are responsible for establishing telecommunications links within Australia and to overseas. We are interested in further information on your Local Multipoint Distribution Service (LMDS).

Can you please fax or mail the further information. My mail address is:

Peter Miller
R&D Contractor
OTC Australia
GPO Box 7000
Sydney NSW 2001
AUSTRALIA.

Yours faithfully,

Peter Miller
R&D Contractor
Network Access Systems R&D

Facsimiles on thermal paper can be highly unstable.

If the accompanying documents contain authorisations or other important information, they should be copied onto good quality paper before filing or otherwise storing.

Australian and Overseas Telecommunications Corporation Limited ACN-051 775 558



Date: Thursday, March 18, 1993
Fax: 908-462-2789
To: CellularVision
Attn: Dan Reiss, Overseas Administrator
From: D. Scott Slade, Director of Operations
Re: Syrian Television

Dear Sir,

Our company is involved in bringing goods and services to the Middle East . We have been asked by a high ranking Syrian Government official to look into bringing a cable television service to the city of Damascus. I feel that your service may be what we are looking for, I would like to talk to you about CellularVision and what it has to offer over a conventional cable network.

Regards

A handwritten signature in black ink, appearing to read "D. Scott Slade", is written over a printed name.

D.Scott Slade

Mabi Conti

International Inc

January 6, 1992

Karen York
Cellular Vission
Suite 12
Group Village Mall
Freehold NJ 07728
908 462 8200
fax 462 2789

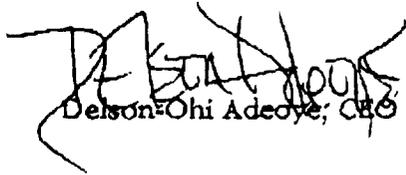
Dear Ms. York:

I saw an article about your company in the Atlanta Journal Constitution recently and wanted to acquaint you with Mabi Conti International's export management services. We are interested in and are sure that the "small, flat antennas about 6" square", described in the article would be a good match for the Nigerian marketplace. The cable industry is beginning to develop in Nigeria and the need for complementary products is great.

My next scheduled trip to Nigeria is January 19. I would like to take some samples of your product with me. I have contacts who will honestly access Nigeria's market acceptance of the product.

If you are at all interested in this proposal. Please contact me as soon as possible.

Sincerely,



Delson Ohi Adeoye, CEO

VITEL (Pvt) Ltd.

To: C.E.O.
CELLULARVISION
U.S.A.

DATE 1/6/93
TEL (908) 462-8200
FAX (908) 462-2789

From: ATHAR LATIF.

TEL +92-21-455-7652
FAX: +92-21-4557651

DEAR SIR,

I WOULD APPRECIATE IF YOU COULD SEND ME AS MUCH AS POSSIBLE INFORMATION ON YOUR COMPANY AND ITS PRODUCT/SERVICE.

I READ ABOUT YOUR COMPANY IN FORTUNE INT'L. CURRENTLY THERE IS NO CABLE COMPANY OPERATIVE IN PAKISTAN. THREE COMPANIES HAVE BEEN AWARDED CELLULAR LICENSES. NUMBER OF COMPANIES ARE OPERATING PAY PHONE SYSTEMS.

I WOULD LIKE TO WORK WITH YOU TO INTRODUCE THIS EMERGING TECHNOLOGY THAT TO MY KNOWLEDGE IS CURRENTLY BEING TEST MARKETED IN N.Y.

I WOULD APPRECIATE IF THE INFORMATION IS FAXED OR COURRIERED TO ENSURE CONFIRM DELIVERY.

LOOKING FORWARD TO A FAVORABLE REPLY.

SINCERELY YOURS.

M. Athar Latif -

MARENGO

Asset Management Inc.

40 Wall Street New York, NY 10005 (212) 344-5790

January 13, 1992

Ms Karen York
Cellular Vision
Suite 12
Village Mall
Freehold, NJ, 07728

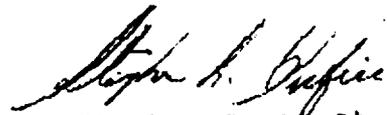
Dear Ms York:

We are writing at the request of our client in response to the two articles which we have seen in the New York Times regarding your company. We were most impressed with your product. Our client is a British company which specializes in project development not only in Great Britain but throughout Europe and provides specialized telecommunications services for these projects. Two of the principal equity holders of our client are Samuel Montagu, the U.K. merchant bank, and Hong Kong and Shanghai Bank Corporation. Our client's Board of Directors is also comprised of certain prominent political people in Great Britain.

We have been requested by our client to obtain more information regarding the technical aspects of your product and to inquire about the possibility of obtaining licensing rights. Our client has indicated that it is highly possible to deliver exclusive contracts from the governments of certain European countries.

We look forward to hearing from you at your earliest possible convenience and we would especially welcome a brief telephone conversation with you or your colleagues.

Sincerely yours,



Stephen S. Ofefice
Principal



GREEN & ASSOCIATES
INTERNATIONAL

BOX 2901 • UPPER DARBY, PA 19082

GREEN & ASSOCIATES
INTERNATIONAL

MIKE GREEN
PRESIDENT

TELEPHONE
215-622-0474

BOX 2901 • UPPER DARBY, PA 19082
TEL. (215) 622-1273 • FAX (215) 622-0474

Ms Karen York
CELLULARVISION
Suite 12
Dag Hammarskjord Blvd
Freehold, NJ 07728

15th April 1993

Dear Madam,

We thank you for the articles dated February 3rd 1993.

We are interesting in taking CellarVision to Jamaica. Originating in Kingston, a city of 700,000 people.

Jamaica presently has one television station and is visited by over one million Americans and other foreigners who would welcome the chance to see their favorite shows while on the island each year.

We are therefore seeking your advice and support as to make this possible. We are willing to work with you in any way possible.

I eagerly awaits your reply.

Yours sincerely,


Mike Green

PRESIDENT



January 18, 1993

Mr. Tom Ryan
Cellular Vision,
Dag Hammarskjold Blvd.,
Freehold,
New Jersey 07728,
USA

Dear Mr. Tom Ryan:

I am thankful for your response to my inquiry and I find your system very interesting. Concerning the Non Disclosure Agreement, we are a little bit unfamiliar with that type of agreements and so far we do not know the general consequences for us as the state telecommunication operator with a multiple of activities in installation, operation, research and development. We have no production facilities, so we buy most of the equipment we need from different companies all over the world. We have about 2.000.000 subscribers.

I am at the Research Department as engineer and for the moment I am looking at different ways to introduce video-on-demand. Your system is very interesting as a distribution system. I would like to have more information and I have some questions:

- Would it be possible for you to give a demonstration of the system in Norway ?
- Would it be possible to buy a system for test purpose ?
- How is the operation of the return path and how is the capacity ?

Sincerely,



Knut Sinkerud
Senior Research Engineer



**Società Italiana per l'Esercizio
delle Telecomunicazioni p.a.
DG - R/RS - T**

Tel.: +39 6 3688 6236 Fax.: +39 6 3222639

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1

Da / From / Von :

Mr. Fabrizio ZABBERONI

A / To / An :

Mr. Dan REISS

Messaggio / Message / Nachricht :

Dear Mr. Reiss.

as discussed by phone, we will very interested in getting more information about your TV microwave system recently approved by the FCC.

We wonder if you could be so kind to send to us (by fax or/and by mail) all the technical characteristics of it and, if possible, also some information about the field trials that are running in New York.

In the following you can find my complete address and Tel/fax numbers:

**Mr. Fabrizio ZABBERONI
SIP Headquarters
Research & Development - Transmission
Via della Vignaccia, 45
00163 Rome (ITALY)**

Tel. + 39 6 3688 639

Fax. + 39 6 3222639

Best regards

Fabrizio ZABBERONI

Rome, 19 January 1993



INTERNATIONAL TRADERS GROUP

20101 Birch St.,
Suite 150 Q
Santa Ana Heights, CA 92707 U.S.A.

Tel : (714) 252-1192
Fax : (714) 252-0992

Cellular Vision
Village Mall
Free Hold NJ 07728
Fax: 908 462-2789
Attn: Mr. Dan Reiss

February 4, 1993

Dear Mr. Reiss,

In reference to our phone conversation this morning we would like to introduce International Traders Group. We are an agent/buyer for overseas clients and representatives for a variety of companies in the Middle East.

Our parent company is Hiltex Co., with offices in Beirut, Lebanon. Hiltex Co. has been in the business of representing and marketing foreign products and projects for over thirty years. Over this time period Hiltex has established a solid contact with government officials enabling it to compete and perform particularly successfully in local ventures. Now that the political situation in Lebanon has improved and the country is undergoing major reconstruction, the market is opening up to new developments.

Having seen Cellular Vision Co. on CNN News, Hiltex requested that we contact you in regards to the Cellular Cable System that your company has developed. Hiltex is interested in introducing this system in to the Lebanese broadcasting market. We feel that there is a great opportunity in this very receptive market.

We hope that Cellular Vision would consider Hiltex Co's proposal and furnish International Traders Group with the required information to be forwarded to Hiltex in Lebanon.

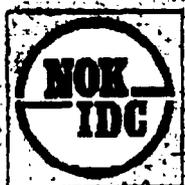
Should you need any further information please do not hesitate in contacting us at: (714) 252-1192.

Thanking you in advance. We look forward to your reply.

Sincerely,



Hassib Hilal



NYWERTIID-ONTWIKKELINGSKORPORASIE VAN SUID-AFRIKA BEPERK
INDUSTRIAL DEVELOPMENT CORPORATION OF SOUTH AFRICA LIMITED

Fredmanruim 19, Sandton
Postbus 784055, Sandton, 2146, R.S.A.
Teleks 4-27174 SA, 4-27201 SA
Telefaks (011) 883-1655
Telefoon (011) 883-1600

19 Fredman Drive, Sandton
P.O. Box 784055, Sandton, 2146, R.S.A.
Telex 4-27174 SA, 4 27201 SA
Telefax (011) 883-1655
Telephone (011) 883-1600

IDC: 0732

1 June 1993

Mr Shant Hovnanian
Cellular Vision
Suite 12
Village Mall
Freehold, New Jersey 07728
USA

Fax No: 908-462-2789

Dear Mr Hovnanian

LOCAL MULTIPOINT DISTRIBUTION SYSTEM (LMDS)

We recently received some cursory information regarding the above system from Dr Jan S Marais, a South African businessman, who had in his turn received the information from a certain Mr Alan D Buck of Bushnell, Florida. Mr Buck informed Dr Marais that Cellular Vision developed the LMDS system and suggested that you be contacted directly. As we are currently investigating various means of applying technology in education and training in order to alleviate the education crisis in South Africa, we would appreciate if you could forward us more detailed information on the hardware required as well as the uses of and costs involved in implementing such a system. It would also be very useful to know of pilot studies or projects where this system has been implemented as well as the constraints or limitations of the system.

Yours sincerely

A handwritten signature in black ink, appearing to be 'E du Plessis', written over a horizontal line.

E DU PLESSIS
DEPUTY GENERAL MANAGER

PRESS CLIPS

Reprinted From Friday, December 11, 1992

A New Microwave System Poses Threat to Cable TV

By EDMUND L. ANDREWS

Special to The New York Times

WASHINGTON, Dec. 10 — The Federal Communications Commission approved a new microwave technology today to transmit simultaneously dozens of channels of television, telephone calls and large amounts of data.

The system, which would use superhigh-frequency radio signals to deliver up to 49 television channels, could pose a threat to the virtual monopoly that cable television systems enjoy today in most cities. The system was recently introduced, on an experimental basis, to homes in Brighton Beach, Brooklyn.

One big advantage to the technology is that it avoids the need to spend millions of dollars to lay cables to every home in a city, a cost that is passed on to cable television subscribers.

Once Considered Unusable

The main innovation of the new technology is its use of extremely high-frequency microwaves to transmit information. Until now, these radio frequencies — far higher than the UHF and VHF signals commonly used in television broadcasting — have been considered unusable for anything more than transmitting data between two sites in full view of each other.

The new technology was developed by a Freehold, N.J., start-up company called Cellular Vision of New York Inc. Company officials said the technology would make it possible to undercut, by more than half, the prices of cable television companies, which deliver their signals over wires.

Impressed by the results from two years of technical tests, the F.C.C. today proposed allocating a big block of superhigh radio frequencies for the new technology and offering licenses to two companies in each market. Recognizing Cellular Vision as the pioneer, the commission tentatively gave it the chance to choose between a license for the metropolitan New York or Los Angeles areas. Licenses for other markets will probably be issued through a lottery process, perhaps as soon as next summer.

The developers of the technology assert that they can reach almost every site in a metropolitan area, in part by bouncing signals off buildings and other objects until they reach their ultimate destination.

In Brighton Beach, the company began offering a package of

Microwave System May Threaten Cable TV

several dozen cable television channels, including Cable News Network, ESPN, MTV and two movie channels, for \$29.95 a month. Customers receive signals over small, flat antennas about six inches square that can be placed indoors or outside. The company said a similar package of channels offered by the Cablevision Systems Corporation, the cable company that serves Brighton Beach, would cost \$50 a month.

One Brighton Beach resident enthusiastically praised the new service. The picture quality is "just about perfect, much better than what I had before," said Michael Boyars, the co-owner of a heating and air-conditioning company who began subscribing to the service in June. "The reception has been rather phenomenal," he added. "I can't figure out how it works."

Company officials contend that the new system approaches the capabilities of fiber-optic cables, the hair-thin strands of glass that relay vast quantities of data as high-speed pulses of light.

"This is basically giving you fiber optics to the home, and it is interactive," said Shant Hovnanian, a founder of Cellular Vision. Interactive refers to a system's ability to provide two-way communications, so users could exchange computer data, for example. The Brighton Beach system does not currently offer such services.

The technology itself was invented and patented by Bernard B. Bossard, an electrical engineer and entrepreneur who specialized in microwave communications equipment. Mr. Bossard had teamed up in the mid-1980's with Mr. Hovnanian and his father, Vahak Hovnanian, a large real estate developer in New Jersey. The Hovnanians, who were already using big satellite dishes to offer television service to homes they built, provided financing for Mr. Bossard's research.

The Cellular Vision system transmits television at frequencies of 28 gigahertz, or 28 billion cycles of radio energy a second, which is so high in the radio spectrum that almost no one uses it.

But these super-high frequencies usually require that an unobstructed line of sight be established between the transmitter and receiver. Mr. Bossard said the frequencies also tend to be unstable, so that adjacent channels often interfere with one another. The problem is a little like driving high-speed motorboats side by side; the waves tend to overlap one another.

Company officials say they solved the line-of-sight problem by taking advantage of the fact that signals at



The picture quality is "just about perfect, much better than what I had before," said Michael Boyars, a Brighton Beach resident, of a new microwave technology that can deliver dozens of television channels.

such high frequencies ricochet off many types of obstacles without losing much of their quality. The system's transmitter sends out signals in all directions so they bounce off many surfaces until they reach individual receivers.

In addition, the new system borrows technology from the cellular telephone industry to divide a big city into smaller "cells" — areas that are each served by a separate transmitter. Ordinary television broadcasters can use only one transmitter in a city, because using multiple towers would make signals hopelessly jumbled.

F.C.C. officials said the new system avoided that problem by having adjacent cells orient the angles of their signals differently. The result, they said, is that receivers in one part of town cannot pick up signals that stray over from another area.

Prospects Are Uncertain

But commercial prospects for the new technology remain entirely unclear. For one thing, the system has not yet proved itself in a dense urban area with many customers. Beyond that, the system will have to compete against many other new technologies being developed by the cable industry itself and by new satellite companies. Just last week, Tele-Communications Inc. of Denver announced that it would begin installing technology to offer as many as 500 channels to individual homes.

Some experts cautioned that there may be problems with the Cellular Vision system.

"Bouncing off buildings can be a big benefit of using these frequencies, but it can also be a severe limitation," said William Utlaut, associate director of the Institute for Telecommunication Sciences in Boulder, Colo., a research arm of the Com-

merce Department. The problem, Mr. Utlaut said, is that bouncing signals can cause the "ghosts" that have always marred ordinary broadcast television.

But Mr. Bossard said that was not a problem, because an antenna would be capable of receiving only one of the many signals bouncing around. The company hopes to erect transmitters throughout the New York metropolitan area by mid-1994; it also hopes to apply for licenses to serve other cities.

Cable Companies Prepared

Cable television executives said yesterday that they were unfamiliar with the technology but were prepared for greater competition.

"It's another form of competition that we're prepared to face," said Carole Shandler, a spokesperson for Cablevision Systems, based in Woodbury, L.I., which operates cable franchises in many parts of the New York metropolitan area.

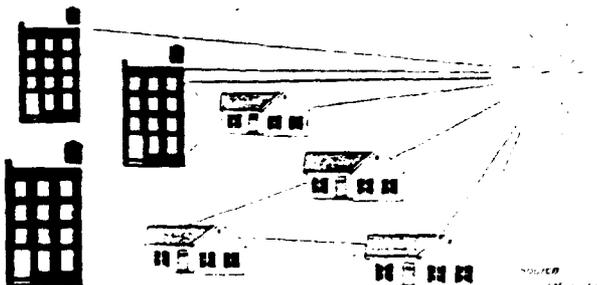
Robert Thomson, a senior vice president of Tele-Communications, the nation's biggest cable operator, said cable systems would probably hold up well, given their own use of new technologies to offer interactive services and hundreds of channels of programming.

A new cable television law, passed by Congress in October, could give new competitors an important boost in acquiring popular programming. The law forces companies that both operate cable systems and produce programs — like Time Warner's Home Box Office or the Discovery Channel, which is partly owned by Tele-Communications — to make their shows available to competitors on the same terms as they are offered to regular cable outlets.

Using High Frequency to Transmit

Cellular Vision uses superhigh-frequency microwaves to transmit television signals as well as telephone service and large volumes of data over the airwaves.

Such superhigh-frequency microwaves usually require an unobstructed line of sight between transmitter and receiver. The company solved the problem by taking advantage of the fact that the waves ricochet off surfaces without losing much of their quality.



Receivers for such high-frequency waves can be as small as a few inches square.

The system can also use more than one transmitter in a city by modulating the signals, bouncing one vertically and an adjacent one horizontally.

Broadcasting

Technology

FM WIRELESS TV TO BITE THE APPLE

CellularVision commits \$20 million-plus to N.Y. expansion

By Peter Lambert

A startup company in Brighton Beach, N.Y. (Brooklyn), has taken much of the television industry by surprise this past week, bringing a new cellular, multichannel TV-voice-data player into the mix of cable, broadcast, multipoint microwave (MMDS), local exchange and satellite competitors. Still absorbing the news about Local Multipoint Distribution Service (LMDS), those competitors remain open but skeptical about its potential impact.

Last Monday (Dec. 15), with a proposed spectrum allocation and pioneer preference from the FCC in hand, CellularVision (CV) of New York committed more than \$20 million to expand its 49-channel, wireless TV service now operating in the 28 ghz frequency band in Brighton Beach, ordering 100,000 consumer antennas and converter boxes.

The reverse-polarity FM technology offers up to 98 one-way video channels or a mix of one and two-way services. CV, which will franchise its system to operators nationwide, believes the hardware is highly cost competitive from day one.

CV will target the New York area with services including video on demand, interactive and high-definition TV, high-speed data, personal communications, telephone and educational services. "We expect to compete successfully with existing cable television providers because we offer higher-quality television transmissions at lower prices," says CV partner Shant Hovnanian.

However, CellularVision inventor and partner Bernard Bossard believes competitiveness with cable "is being overplayed. Our two-way capabilities may make us complementary with cable."

CV did not disclose the terms of its contracts with MA/Com Inc. and Alpha Industries for antennas and with Hughes Aircraft and Catel Corp. for transmitters. But with each antenna receiver unit running about \$260, the order may approach \$26 million. When a smart-card encryption system is integrated into the receiver by next spring, the unit price will rise to about \$350.

CV plans to own and install 5,000 units by the end of March 1993. Given approval of the FCC's 27.5-29.5 ghz band allocation for LMDS and its proposal to license two operators in each of 489 cellular service areas nationwide (BROADCASTING, Dec. 14), CV will seek other licenses. More than 950 LMDS applications were thrown out until a lottery or other licensing procedure is implemented.

The hardware comprises a satellite downlink; omni-directional transmitter; 4-by-4-inch receive antennas mounted on subscriber windowsills, and set-top tuners. The company claims its per-subscriber construction, operating and maintenance costs will run under \$500, compared with more than \$3,000 for fiber optic; \$2,000 for cable; \$1,000 for DBS, and \$750 for standard multichannel multipoint distribution service (MMDS), or wireless cable.

CV launched last June, offering a \$25.95 basic package of 39 cable programming services; \$29.95 with Showtime and The



Inventor Bernard Bossard and partner Shant Hovnanian predict 5,000 subscriptions by spring.

Movie Channel. Although Turner Broadcasting has been reluctant to offer TNT, Bossard says, overall, access to programming has not been an issue, as it negotiates carriage of HBO, The Disney Channel, regional sports and pay-per-view services.

The proposed rulemaking does not rule out existing cable or local telephone companies from LMDS cross-ownership. But, at least on first blush, several cable executives pointed to line-of-sight difficulties and the threat of rain fade at high frequencies as reasons to be skeptical about the 28 ghz service.

However, Bossard says rain fade is already figured into the 28.5-square mile cell size. As for line of sight, while FM transmission allows relatively ghostless reception off of buildings, CellularVision plans to use reflectors or "very low cost repeaters, about \$700 each" to create microcells and fill in line-of-sight gaps.

Even so, Bossard concedes, "it would take a fortune" to make the service available to 90% of service area residents within three years, as the FCC proposes.

In an open letter dated Dec. 10, the Competitive Cable Association said: "This new action by the commission is no small adventure. There are about 100 video-size channels (each about 20 mhz) in the band 27.5-29.5 ghz. That should be enough to cure the problem that has so far impeded wireless cable."

Noting that "to date, this is only a single-cell test," Wireless Cable Association President Robert Schmidt says if LMDS truly affords competition in video, voice and data, WCA members "will line up" with other license applicants.

However, Schmidt adds, "so far, all the research and manufacturing are in AM. We're doing this today, and our cell reaches 50 miles."

By early January, he adds, WCA will begin sharing encouraging results from digital MMDS field tests in San Bernardino, Calif. Top cable operator Tele-Communications Inc.'s \$200 million commitment to digital channel expansion (BROADCASTING, Dec. 7) "says the train will leave the station," Schmidt says. "We intend to be on that train." ■

Enterprise Networking

Cellular technology may rival fiber-optic networks

By Joanie M. Wexler
WASHINGTON, D.C.

■ **A high-speed cellular technology is emerging that could ultimately usurp fiber-optic cabling for carrying heavy-duty telecommunications applications. Its success, however, hinges on a few regulatory "ifs."**

The Federal Communications Commission (FCC) this month approved the use of "CellularVision," a technology patented by CellularVision in Freehold, N.J., for running high-bandwidth applications over the nation's airwaves. Traffic traveling in CellularVision's 27.5- to 29.5-GHz FM radio band could include videoconferencing, high-definition television, medical imaging, multimedia and high-speed data, according to CellularVision inventor Bernard Bossard.

Bossard said uncompressed information could travel at about 1G bit/sec. and that the technology requires a transceiver and modem at each communicating site.

How the FCC will allocate the CellularVision spectrum remains a question—and one that will likely determine the usefulness of the technology to the business user. Benefits will depend on "how the FCC decides to divvy up licenses geographically, how many licenses are granted and how much spectrum each licensee gets," said Brian Moir, a partner at Fisher, Wayland, Cooper and Leader, a Washington, D.C., law firm that provides counsel to the International Communications Association user group.

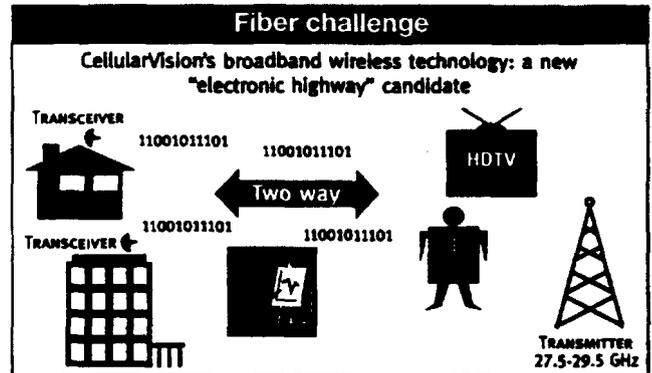
Nationwide licensing

For example, if the FCC issued a single nationwide license, it would result in a seamless network for users, who would not have to contract with several carriers for interconnecting wireless segments. This could solve some of the problems faced by today's analog cellular telephone networks, where rates remain high because the spectrum is licensed in local chunks "and the interconnect charges between service areas are a fortune," Moir explained.

But the downside of a single license "is that the resources required to build a system like that [nationwide] are significantly higher," he said.

These issues parallel those with emerging personal communications networks (PCN), which will someday issue nomadic users a single, mobile phone number. One PCN proposal to the FCC from MCI Communications Corp. is to allocate spectrum to a small number of consortia nationwide in order to deliver both the seamlessness and the resources required to fund the network infrastructure [CW, Nov. 16].

Depending on how the specifics play out, CellularVision could fill a gap in the growing mobile computer market: Today's relatively slow (19.2K bit/sec.) wireless wide-area



CW Chart: Michael Siggins

networks are frustrating users who are accustomed to local-area network speeds. Also, users such as John Faccibene, vice president of telecommunications at Garban Ltd., a New York brokerage firm, said he sees CellularVision's capabilities as providing the bandwidth and flexibility for creating virtual offices or trading floors, particularly in a disaster recovery situation.

"During the floods here in New York City, a lot of companies lost their trading rooms," he said. "Imagine if they had ability to move to another location via wireless."

A high-speed wireless network could preclude the expensive and time-consuming task of laying fiber to all doorsteps to make services ubiquitous, added Andrew M. Seybold, publisher of the "Outlook on Computing" newsletter. He said that in an urban area, "cable is probably cheaper because I can run a cable down a major street and pull drops off of it. Each drop would be less expensive than having a separate transmitter and receiver at each user location."

However, he said, "the cable companies cannot make their systems two-way [interactive] without a tremendous upgrade."

Bossard said several Bell telephone companies have expressed interest in CellularVision. An Ameritech Co. spokesman confirmed that his company has "had some conversations with CellularVision, but it is too early to assess how it might fit into the overall scheme of wireless communications."

'Better' cellular

Each CellularVision cell spans 6 to 8 miles in diameter. When transmitting among cells, CellularVision reuses the same frequency so the full 2 GHz is continually available. This differs from today's analog cellular phone network, through which communications change frequencies from cell to cell. This reduces the amount of bandwidth available. CellularVision rivals fiber-optic capabilities, transporting traffic at 1G bit/sec. speeds.

THE WALL STREET JOURNAL

MARKET PLACE

Reprinted-Friday, December 11, 1992

MARKET & MEDIA

FCC Proposes Using New Technology To Send Video and Voice by Airwaves

By MARY LU CARNEVALE

Staff Reporter of THE WALL STREET JOURNAL

WASHINGTON — The Federal Communications Commission proposed using airwaves to deliver video and voice in what could be competition for both cable television and local telephone monopolies.

The new technology could open the way for local telephone companies to provide two-way video services and other advanced telecommunications — including movies on demand, video teleconferencing, and telecommuting services. Other companies, such as cable TV operators, could turn around and use the technology to compete with phone companies.

"The full potential of this technology has yet to be explored," said Robert Pepper, head of the FCC's Office of Plans and Policy. "But it holds the very exciting prospect of introducing new services in both the video and the telecommunications marketplaces."

The commission voted, 5-0, to seek public comment on its plan to set up the service in the 28 gigahertz band — a frequency that once was considered too high to be useful. Under the FCC plan, licenses would be awarded to two operators in each of 489 regions across the country. Every operator would receive a 1000 megahertz block of spectrum.

The plan grew out of a request by Suite 12 Group, a Freehold, N.J., partnership, that developed a system to deliver high-quality video over a network that uses microcells to transmit signals to a flat, four-square-inch antenna mounted either inside or outside a house window. The partnership recently began offering 49 channels of cable TV programming in Brooklyn's Brighton Beach neighborhood for \$29.95 a month, according to the company.

Shant Hovnanian, a company partner, said the system can be installed for about \$350 a subscriber, less than half the cost of

building a typical cable TV system, and a fraction of the cost of stringing optical fiber to homes. The system, known as Cellularvision, is based on patented technology invented by Bernard Bossard, another partner.

Several telephone company and cable TV officials reached yesterday said that Suite 12's technology and the FCC action was a surprise. "We've tried to keep it quiet until the FCC vote," Mr. Hovnanian said, adding that contentious Washington proceedings can stifle new technology.

Eventually, Mr. Hovnanian said, compression technology, which shrinks the amount of data needed to transmit video signals, would permit video cellular systems to carry hundreds of channels. Subscribers could be linked through phone lines or cable networks to "video jukeboxes" that store thousands of movies, TV programs and other offerings.

The FCC also voted to award Suite 12 a so-called pioneer's preference—a licensing advantage given to companies that create services. But the award was for the license Suite 12 already holds for the New York area, rather than the license it sought for Los Angeles.

Separately, the agency proposed adopting a Motorola Inc. system as the standard for AM-radio stereo broadcasting. The FCC said that about 660 of the nation's 5,000 AM stations already have converted to stereo and that 90% of the stereo stations use the Motorola system.

The commission was directed under a new law to adopt a single AM stereo standard, and the proposal is the first step in that process. Under the proposal, stations using other stereo systems would have to stop using them a year after the rules go into effect next year.

ELECTRONIC MEDIA

Cable TV competitors leap to get foot in door

By WAYNE WALLEY
NEW YORK BUREAU CHIEF

New York—Two new TV services took advantage of recent Federal Communications Commission rulings last week, setting up more potential competition for the cable industry.

CellularVision last week started rolling out its broadband over-the-air alternative to cable delivery in the Brighton Beach section of Brooklyn with plans to offer the microwave service in other areas here in the next 18 months.

The rollout followed the FCC's Dec. 10 decision to reallocate spectrum for delivery of TV and telecommunications services by a super-high FM radio signal and grant the sole license for the New York metropolitan area to CellularVision.

In addition, Bell Atlantic last week said it will install fiber-optic and coaxial cables to carry telephone and "video dial-tone" service for Future Vision of America Corp. in Downingtown, Pa.

Future Vision plans to use the system to offer packages, including 124 TV services, to 38,000 homes in Dover Township, N.J.

The Bell Atlantic move takes advantage of new FCC rules adopted earlier this year that allow telephone companies to offer a video dial-tone for other companies that want to distribute TV programming.

The two developments, though unrelated, are the latest in a series of new delivery-system ventures.

Initially, CellularVision says, it plans to target densely populated areas that don't have cable service, using its new microwave system to deliver as many as 100 channels.

"There are enough customers to address that aren't passed by cable to make us thrive," said Shant Hovnanian, a partner in CellularVision of New York.

"I won't say we will not go after cabled areas, but there is enough of a market share that is not cabled to make a business."

Mr. Hovnanian said the company currently has 200 customers in Brighton Beach and has ordered 100,000 of the 4½-inch square antennas it uses in addition to the

necessary transmitters and other equipment.

The company has signed contracts with MA/Com and Alpha Industries for antenna production and with Hughes Aircraft and Catel Corp. to manufacture transmitters and transmitter components.

"This can be the telecommunications system of the future and be inexpensive as an alternative to fiber optics because it can deliver what fiber can deliver at a fraction of the cost," Mr. Hovnanian said.

The CellularVision system, invented by Bernard Bossard, a partner in the company, uses a single transmitter to serve a 28.5 square-mile "cell" and can be linked to adjacent cells across an area with point-to-point transmitters.

The signal, which uses a short wavelength in FM format in the microwave band, is received in the home or office by the 4½-inch square flat-panel antenna, which can be mounted on a windowsill or outside a window.

The antenna is then connected to a TV set-top converter by coaxial cable.

Currently, CellularVision is charging customers a \$50 installation fee to hook up the special antenna and \$29.95 for 49 channels, including Showtime and The Movie Channel.

In Dover Township, Bell Atlantic is planning to install a combination of fiber-optic and coaxial cables to make its video dial-tone TV service available through Future Vision.

Future Vision is expected to offer customers 124 channels of programming that can be customized into packages of 60 channels for each neighborhood.

It will potentially be able to allow subscribers to order services per day.

The company has yet to set a price for its TV services, but it is likely to be competitive with the average \$33 per month charged by Adelphia Cable, the holder of the area's local cable franchise.

Bell Atlantic, which is based in Philadelphia, last week said it hopes to make similar deals with programming partners in other cities.#

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BUSINESS

TV's New Frontier

FCC Proposes Cellular-Style Delivery System

By JUBE SHIVER Jr.
TIMES STAFF WRITER

WASHINGTON—The Federal Communications Commission on Thursday proposed opening the nation's airwaves to a breakthrough technology that could provide a lower-cost alternative to existing cable television, fiber-optic and telephone services.

Already in operation on a trial basis in Brighton Beach, N.Y., the new technology uses super-high-frequency microwaves previously believed to be too weak and volatile for significant commercial applications.

A Freehold, N.J., company called Cellularvision patented the new technology, which mimics the operation of cellular phone systems. Like cellular, it uses an array of transceivers that can provide, simultaneously, 41 or more channels of cable television; local telephone service; video conferencing, and even interactive, two-way video communications.

The commission signaled its intent on Thursday to authorize full-scale development of the technology by next summer in 489 local service areas across the nation. New licenses for operating the local systems would be awarded by lottery, an agency official said.

The FCC invited industry officials to comment on the potential impact of the plan.

Experts say the new system could pose a significant competitive threat to cable—as well as even newer video technologies, such as direct broadcast satellite. The new system can deliver services to homes that can't be reached by cable, they note. And its compact disc-sized antenna is much smaller than those of many other video services.

"This could be significant competition to the cable industry," said Cheryl Tritt,

A Growing Array of Technologies

Technological advances are opening the door to a broad range of new telecommunications services:

Local Multi-Point Distribution: Given the go-ahead Thursday by the FCC, this system uses super-high-frequency microwaves to beam cable signals, local telephone service and interactive video to a compact disc-sized home antenna. A pilot project is operating in Brighton Beach, N.Y.

Cellular Cable: Can deliver scores of cable TV channels and other telecommunications services to six-inch, window-mounted antennas. The technology uses very-high-frequency microwave signals that are beamed from multiple locations within a single service area.

Wireless Cable: Another microwave-based technology, wireless cable systems are already emerging in many cities across the country. But they cannot be used in all areas because of lack of frequencies, and they're subject to interference from building and trees. They also require a larger receiving dish and have less capacity than the cellular cable technology.

Traditional Cable: Most major cable operators plan to use digital video compression systems to dramatically increase the capacity of their systems. The nation's largest operator, Tele-Communications Inc., is working on a system that will carry 500 channels. Digital systems don't require changes in the cables themselves, but do require expensive new converter boxes.

Telephone Networks: New technologies make it possible to send a few channels over existing copper phone lines. But phone companies are installing fiber-optic cables in some areas that will make it possible to increase both quality and capacity. It will be years before fiber-optics reaches all the way to the home.

Satellites: Today a large and expensive receiving dish is required to capture TV signals from a satellite. In the future, the size of the dish will be dramatically reduced. Combined with digital transmission technology, such satellite systems will be able to deliver hundreds of channels to pizza-sized, window-mounted dishes.

—JONATHAN WEBER

chief of the FCC's common carrier bureau, which is overseeing the new technology.

"It's a technology worth watching," added John J. Sie, chairman of Encore Media Corp., a Denver-based cable program supplier. "It seems to have a much lower cost" of operation than cable and other video technologies.

A cable industry spokeswoman, nevertheless, seemed unfazed.

"Cable television developed and legitimized the concept of subscription tele-

vision, so it's no surprise to us that we would face competition from a variety of sources," said Peggy Laramie, a spokeswoman for the National Cable Television Assn.

The new technology is known as "local multi-point distribution system," or LMDS. It is so little known that few industry officials understood it well enough Thursday to speculate how it might affect the communications industry, which has erupted with a number of

Continued

CABLE: FCC May OK Plan

Continued

new technologies in recent years.

But among those willing to hazard an opinion, several had reservations about how the microwave technology would fare in inclement weather or amid tall buildings that might interfere with the transmission signal.

Others said that it would take more than superior technology to crack cable's video juggernaut.

"It sounds like it's a better mouse trap," said John Reidy, a media analyst with Smith Barney, Harris Upham & Co. "But new technology doesn't make an entertainment business. It's what you are offering on that technology."

For a \$29.95 monthly fee, subscribers in Brighton Beach can receive up to 41 channels of video, including basic cable service and

'It sounds like it's a better mouse trap. But new technology doesn't make an entertainment business. It's what you are offering on that technology.'

—
JOHN REIDY
Media analyst
Smith Barney, Harris Upham & Co.

such pay-television programming as Showtime and The Movie Channel, said Bernard Bossard, a partner at Cellularvision who invented the new technology.

The system, which has an information-carrying capacity that rivals fiber optics, uses a part of the super-high frequency microwave band to provide a signal that is superior to cable or broadcast TV, Bossard said.

So far, he added, the company has not encountered problems acquiring video programming from suppliers.

On the telecommunications front, Bernard Walker, an associate manager at Teleport Communications Group, a New York-based company that provides telephone services to several business, said LMDS could join firms like his in facing significant resistance from the regional Bell telephone companies.

The local Bells would have to provide access to their telephone switching stations.

In supporting the new technology, the FCC is carrying out provisions in the recently passed Cable Television Act aimed at encouraging greater cable competition—thereby keeping video programming prices lower and offering Americans more viewing choices.

The FCC's proposal came a day after six members of Congress wrote FCC Chairman Alfred C. Sikes to complain that some cable television operators appear to be aggressively raising their rates before the new law takes effect.

"In what appears to be an attempt to evade the law, many cable companies are raising rates before the FCC's rate regulations are in place," the letter says.

FCC officials said that the commission may ask for rate roll backs. But one agency official told commissioners that, under the law, the FCC has no authority to order any refunds to cable subscribers.

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TECHNOLOGY FOR THE GLOBAL TELECOM NETWORK

WIRELESS

Get Ready For Cellular TV

Spectrum reallocation in the microwave band has paved the way for CellularVision—the first wireless, two-way integrated broadband delivery of services. *By Bernard Bossard*

IF faster, better and cheaper telecommunications means paving a smoother electronic highway, wireless technology offers two major advantages: it bypasses hard-wired systems' limitations and avoids congestion on narrowband spectrum.

Yet, wireless communications have been hampered by wide-bandwidth, high-performance spectrum scarcity. TVs, radios, pagers, telephones and other communication devices monopolize low spectrum frequencies, while point-to-point communications clog high frequencies.

In December 1992, the Federal Communications Commission (FCC) reallocated the 27.5GHz to 29.5GHz microwave band for point-to-multipoint broadcasting distribution, laying the foundation for a new video, voice and data roadway. CellularVision (a patented technology using that roadway) provides the first wireless, two-way integrated broadband delivery of entertainment, information, transactional services and interactive video to homes and businesses. By harnessing this virtually unused spectrum segment, CellularVision provides the capacity and advantages of hard-wired fiber optic systems at one-tenth the cost.

► How the Technology Works

CellularVision is a multicell-configured distribution system operating in the 27.5GHz to 29.5GHz microwave band.

The FCC has allocated the system 1GHz for television delivery and 1GHz for experimental data and telephone service. To provide television service within a cell, the 1GHz is used to transmit +9 video channels, each comprising a frequency-modulated (FM) signal occupying a 20MHz channel.

Two-way, or interactive, communication channels can be inserted between the video channels for transmission back on opposite polarity. This reverse polarization, or interleaving, allows simultaneous use of signals at the same frequency for two applications. It also eliminates interference in collocated cells and doubles each Gigahertz' potential. Thus, CellularVision boasts enormous capacity:

CellularVision boasts enormous capacity; the system, for example, could distribute up to 100 channels of video to the home without employing compression.

the system, for example, could distribute up to 100 channels of video to the home without employing compression.

Hardware components in each

regional delivery system include one headend (satellite or terrestrial microwave) downlink facility for the central cell; one omni-directional transmitter for the central cell and additional transmitters for adjacent cells; one receiver or antenna, approximately 4.5 square inches; and one TV set-top tuner in each subscriber's home. Interactive applications require an additional transceiver.

Video programming is delivered from satellite transponders, terrestrial microwave facilities or a studio to the central cell in a regional delivery system. The headend at the central cell transmits programming via point-to-point links operating in the same 28GHz band to adjacent cells. Each cell retransmits the programming into adjacent cells without needing additional headends or other signal sources except when programming changes occur.

Within each cell, shadow areas (those not directly within the transmitting antenna's lines of sight) are covered by low-power active repeaters (200 milliwatts) or background reflectors such as buildings. CellularVision's FM-based systems can use low-cost, passive or active co-channel repeaters without distorting the system, achieving complete coverage within a cell.

► Quality and Capacity Achievements

Several factors contribute to the

system's high quality and capacity. Narrow bandwidths allow receiving antennas to "focus" better on the signal and reject the multi-path phenomenon, in conjunction with frequency modulation and polarization isolation. The 28GHz band allows narrowband high-gain antennas to isolate the signal from adjacent transmissions and gives small antennas the performance of much larger ones (i.e., a six-inch antenna at 28GHz performs as well as a three-foot antenna at 4GHz).

Interleaving increases capacity and reduces interference by simultaneously transmitting remote beams in a perpendicular "woven" pattern. Eliminating adjacent cell interference improves reception to studio quality and maximizes spectrum reuse. In traditional cellular systems, interference from adjacent cells only allows reuse of identical channels in one of seven cells.

In 1991, the FCC granted a permit for initial operation of point-to-multi-point television transmission to CellularVision Technologies & Telecommunications, owner and licensor of CellularVision technology. In the Brighton Beach area of Brooklyn, N.Y., CellularVision of New York currently is bringing the first-ever cellular television to many families previously unserved by cable operators. Subscribers receive wireless delivery of a basic package of 49 cable stations plus two premium channels for less than \$30 per month.

As this initial program enters its second year, CellularVision is gearing up for a dramatic leap beyond mainstream video delivery, telephone and personal communications networking.

► CellularVision vs. Fiber Optics and Cable

The difference between CellularVision and hard-wired systems is akin to the difference between moving data through a straw *versus* a tunnel. Information transmitted by hard-wired systems first must be compressed to fit within the wires' capacity. CellularVision faces no such constraints because it travels via the airwaves from the transmission site to a home or business. This means CellularVision can provide significantly more information at better quality than cable or fiber optics.

In addition, CellularVision improves broadcast transmission clarity because it operates in the FM band. TV studios broadcast in this band, but the signal is converted to AM prior to transmission, reducing the received signal's quality. With CellularVision, the FM broadcast signal converts to AM only when it reaches the television converter box, resulting in a higher resolution picture.

► Wireless Horizons

Although currently used as a low-cost, high quality alternative to cable TV, this unique technology is relevant to emerging computer/communications applications. Consider, for example, the impact of a wireless, two-way integrated broadband system on telephone service. With a radius of three miles, CellularVision cells have a capacity nearly 100 times that of conventional telephone cellular. Transmitting only 10 milliwatts per channel over a three-mile radius, the system achieves better signal-to-noise ratio—and higher-quality voice transmission—than cellular phones' three-watt ratios.

With CellularVision, the lack of narrowband, high-speed telephone lines no longer inhibits telephone use expansion because the system's 1GHz of spectrum provides enormous transmitting capacity—millions of digital-quality telephone calls can be transmitted simultaneously in a multicell system. The need for and high cost of bringing fiber optic capacity to the home virtually would be eliminated.

Reallocation of the 27.5GHz to 29.5GHz microwave band has prompted telephone companies to begin thinking about new service possibilities. CellularVision, on the other hand, already is preparing to license its technology for transmitting multi-channel and interactive television and radio programming; high-definition television; video conferencing; local transactional services such as travel, banking and shopping; educational services for schools and colleges; and medical services such as high-resolution transmission of radiologic films.

As for personal communications services (PCSs) and personal communications networks (PCNs),

current technology mandates voice transmission via some form of hard-wired link—presumably a fiber optic connection—between the transmitting microcell and a telco's central switch. CellularVision provides an alternative to fiber.

CellularVision's multicell configuration, established over broad geographies, would provide a complete broadband infrastructure supporting wireless voice and data transmissions. On the voice side, the system's vast 1GHz of bandwidth would allow CellularVision to serve as a clearinghouse for low-frequency PCS calls, channeling them to telephone, cellular or network distributors. In data transmission, CellularVision's low bit errors (one part in 10 billion) allows transmission of computer data without error correction schemes.

► The Future

In addition to commercial video service in New York, CellularVision is using a Federal Communications Commission experimental license to demonstrate two-way video conferencing, data transmission, microcell technology and mobile communications systems. Solid-state, low-cost transmitters and an interactive multimedia center also are under development.

CellularVision is not just a cable TV competitor but a much cheaper equivalent of wireless fiber optics. As a result, this innovative technology can supersede fiber-optic systems as the most cost-effective route to the future's electronic superhighway. ■

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VENDOR PICTURE BRIGHTENS IN WIRELESS CABLE TELEVISION

Wireless cable is reaching global proportions with the introduction of new and innovative services.

ROM SCHNEIDERMAN
SENIOR EDITOR, NEWS

TWO of comedian George Carlin's favorite oxymorons are jumbo shrimp and military intelligence. Now he can add wireless cable. With more than 400,000 subscribers in the U.S. wireless cable television (CATV) has been an increasingly viable pay-television alternative since the late 1980s.

One of the most significant developments for wireless cable system operators was the 1992 Cable Act, which removed wireless cable's last obstacle as a major competitor to CATV. The bill creates equal access to programming; for the first time, programmers must sell to all cable operators—conventional and wireless—at the same cost. With this barrier gone, wireless cable operators believe their business is poised to take off. As a result, several cable networks, including TNT and CNN, have cut their prices to wireless cable operators—and further price cuts are expected.

"The new law does for us what the court did for MCI when it opened

competition with AT&T," says Robert Schmidt, president of the Wireless Cable Association (Washington, DC) and former president of the National Cable Television Association.

Today, there are 140 wireless cable systems in the US as well as operations in 40 countries around the world, including western and eastern Europe, South America, Africa, and the Pacific Rim. The largest wireless system in the world, with 275,000 subscribers, is in Mexico.

According to the Washington, DC-based Wireless Cable Association (WCA), equipment manufacturers are selling more converters to wireless operators than to conventional cable systems.

Unlike conventional cable, wireless cable systems do not require hardwire infrastructure or signal amplification. The system uses an addressable, multi-channel, high-frequency (2.5-GHz) signal that operates along a line-of-sight path to a customer's antenna. The signal is then carried inside the building, via coaxial cable, to a set-top converter box. The wireless signal from one transmitter is able to cover a radius of 50 to 60 miles.

Two key cable-equipment manufacturers, the Jerrold Communications Division of General Instrument Corp. (New York, NY) and Scientific-Atlanta, Inc. (Atlanta, GA), have become major beneficiaries of this



CellularVision's television and interactive multimedia services require a 5-in. (12.7-cm) antenna at the user's end.

WIRELESS CATV

fast-growing market. Jerrold has averaged an 80-percent compound annual growth rate in wireless equipment for each of the past three years, according to Dave Robinson, Jerrold's product-line director. "This year," he says, "we have commitments for over two million set-top terminals."

Zenith Electronics Corp.'s Cable Products Division (Glenview, IL) expects more than 30 percent of its business this year will come from wireless cable operators. Zenith recently demonstrated a wireless product capable of transmitting data over a distance of 15 miles (24 km).

Last month, General Instrument said it would team up with Microsoft (Redmond, WA) and Intel Corp. (Santa Clara, CA) to develop set-top converters which could handle interactive and other advanced television features.

Tele-Communications, Inc., the largest cable provider in the US, is considering adding a 2-GHz transmitter to its next-generation converter so that it can serve as a home base station for a wireless personal communications system.

Stanford Telecommunications, Inc.'s ASIC and Custom Products Division (Sunnyvale, CA), meanwhile, has won prototype acceptance of "voice over CATV" equipment developed for a major, but unnamed, telecommunications customer. The system allows CATV service providers to transmit voice communication locally to homes via existing cable infrastructures. Stanford Telecom developed the system's baseband processing functions for both the headend and subscriber modems.

Located within the subscriber equipment installed in homes, the modem will transmit and receive voice signals between headend stations and the subscriber's telephone. The headend modem has burst communication capabilities to transmit and receive voice signals to and from multiple subscriber modems. Hatch Graham, vice president and general manager of the Stanford Telecom division, says prototypes are currently being shipped.

In August, CellularVision of New York (Freehold, NJ) joined with Bell Atlantic to test CellularVision's ability to support commercial interactive video and data services in the New York City metro area. Bell Atlantic will operate the system and will market CellularVision's service.

CellularVision is a multi-cell, point-to-multipoint distribution system operating in the 27.5-to-29.5-GHz band, a virtually unused segment of the spectrum previously reserved for point-to-point commercial networks. Within a cell, 1 GHz of this frequency range is used to transmit 49 video channels. Each channel consists of an FM signal occupying a 20-MHz channel. Two-way

■

Wireless cable uses a high- frequency signal that operates along a line-of-sight path.

■

communication channels can be inserted between the video channels for transmission back on opposite polarity. This reverse-polarization technique allows signals at the same frequency to be used for two different applications simultaneously. Alternative polarization also eliminates interference in co-located cells and doubles the potential use of each gigahertz of bandwidth. The system uses a 5-in. (12.7-cm), flat-plate antenna which can be mounted inside or outside a home.

CellularVision currently provides an alternative to CATV service with 50 channels in the Brighton Beach section of Brooklyn at a significantly lower price than that of cable. Bernard Bossard, CellularVision's chief engineering officer, says the company plans to double the number of channels that are available.

The Federal Communications Commission (FCC) is expected to

reallocate and license the 28-GHz spectrum nationwide in the coming months, pending the adoption of its proposed local multipoint-distribution-service rules.

In another joint venture, Jerrold and the Reston, VA-based EON Corp. (formerly TV Answer, Inc.) plan to provide interactive services to EON's cable affiliates through Jerrold's PC-based converter units. As part of the agreement, Jerrold will be able to manufacture an optional RF return-path module for insertion by cable technicians into the Jerrold converters. Cable operators will then have three return paths to choose from for interactive responses by consumers: cable, phone modem, or wireless RF.

EON's interactive programming and related services will be delivered nationally by satellite to cable headends and, in turn, via cable to subscriber households. Subscriber responses sent via the RF modules will be carried over the Interactive Video and Data Service (IVDS) Network (218-to-219-MHz) which was permanently allocated for this purpose by the FCC in 1992. The RF modules, or other return-path variations, will be installed at the cable operator's facilities.

EON's interactive services were scheduled to be available by satellite for cable-system previewing and testing this month. Based on the FCC's anticipated schedule, EON's interactive television service is expected to be initially available later this year.

The FCC has begun the IVDS licensing process for the markets of New York City, Los Angeles, Chicago, Philadelphia, Boston, San Francisco, Dallas, Houston, and Washington, DC.

The industry believes that the new generation of digital-compression hardware will make it possible to deliver more than 300 channels of programming—more than most conventional cable systems—by 1994. In addition, compression will extend the signal's range in many cases, creating an even broader telecasting radius for the wireless operator. ••