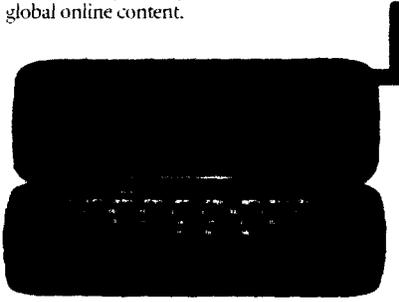




▼ two-way-enabled homes.

Cox, Time Warner and PacBell all will operate as Internet service providers, or ISPs, as well as passive data service carriers. @Home, RoadRunner and Pacific Bell At Home all are many months into the process of developing packages of local and global online content.



All-in-one: phone, e-mail, fax, Net surfing

In July 1995, PacBell launched wholly-owned but independent subsidiary PacBell Internet Services and two months later offered dedicated Internet access to large businesses. In May 1996, it launched dial-up analog access for consumers and small businesses. The carrier counts more than 100,000 ISDN customers statewide, though it makes no regional figures available.

PacBell also could enter the high-speed race in San Diego.

This month, the carrier is expanding its high-speed Digital Subscriber Line, or xDSL, beta trial from about 11 users in San Ramon to 100 or so in San Ramon, Danville and Palo Alto, Calif. It will add remote local area network, or LAN, access to the current Internet access for the next phase of the trial.

By fall, PacBell projects limited commercial rollouts of Asynchronous Transfer Mode, or ATM, xDSL with expanded deployments statewide in 1998, though it won't yet declare San Diego among the early targets.

PacBell also could use its dormant HFC plant in San Diego to roll out its own cable modems.

"We're not blind," says Time Warner's Fellhauer. "We've seen PacBell build HFC in our service area. They're still fumbling with it, but it's there for some reason. We take it seriously, and we're prepared."

FIGHT OR SWITCH

"If people are reluctant to switch providers when they're happy, my job is to do everything to make them too happy to leave," Fellhauer says.

Mario Vecchi, chief technology officer for Excalibur Group, the Time Inc.-Time Warner Cable joint venture behind RoadRunner, says cable modems will keep customers extraordinarily happy by avoiding busy signals. Vecchi says RoadRunner will

avoid the kind of catastrophic performance problems faced by AOL in recent months, in great part because of its "connectionless" architecture. At \$44.95 a month, RoadRunner users will virtually always be logged on to the service.

"AOL's big problem is that every user must set up a physical connection every time he logs on, and the clock is ticking, so he logs off when he's not moving data. We, on the other hand, are connectionless, like a LAN, and everyone stays logged on all the time. In a few years, people will realize that that is an even greater advantage for us than speed," Vecchi says.

In San Diego, both Time Warner and Cox use Motorola Multimedia cable modems designed to deliver data at 10 Mbps into the home and 784 kilobits per second out of the home, and to serve up to five e-mail accounts each.

Time Warner uses proxy, e-mail and management servers from Sun Microsystems Inc. and content fetch software, ATM switches and integration services from Toshiba America Information Systems Inc. The system's network monitoring and management are based on Hewlett-Packard Co.'s HP OpenView system.

The Time Warner headend features half a dozen Sun PROXY UltraSparc servers for local and cached global content, as well as e-mail. Cisco Systems Inc.'s 7500 routers accommodate up to seven 1.5-Mbps T1 lines and frame relay circuits for connectivity to the Internet, local enterprises and the MCI Communications Corp. network operations center.

From the headend, 155-Mbps Synchronous Optical Network, or SONET, multiplexers and Toshiba AX-1500 ATM switches distribute RoadRunner to 11 hubs around Time Warner's fiber rings. There are 18 hubs planned by year's end, each with a Motorola distribution router.

"This is a who's who of information hardware and software," Vecchi says. The starter platform will support 15,000 subscribers, "which we think we'll achieve in 1997."

However, each component can be scaled up as demand dictates. "We had projected 30 percent peak usage in our Akron [Ohio] system, but early results suggest it could be as high as 60 percent," he says.

In addition to keeping Excalibur prepared to meet sudden leaps in demand, "50 or 60 percent simultaneous usage opens major possibilities for advertising and other revenue opportunities with 'push' technology," he says.

Time Warner has pledged a modem to 110 public and private

schools and is negotiating to install fiber to the University of California San Diego campus, a customer ripe for fast data with its microelectronics and biotechnology research, Fellhauer says.

"The gating factor early on will be our ability to install quickly," he says. Teams of cable and PC installers are taking two to three hours to do the job well. Toshiba provides the PC expert to each team.

CUSTOMER FLOOD

In terms of customer support, Southwestern Cable will provide the first two help-desk tiers, first for questions that can be solved at the network level and second for basic computer hardware and software solutions. MCI provides third-tier support.

"We've got a sophisticated labor pool here, and they're all getting extensive training from Motorola, Toshiba and us," Fellhauer says.

Flooded with calls from word-of-mouth publicity, Time Warner postponed the early February launch of infomercials and spots promoting

own Visa credit card.

While Sprint PCS by Cox is available across the whole network, on some parts of its plant Cox has PCS, high-speed data and analog video operating together — "a first, we think, anywhere," says Vice President and General Manager Bill Geppert.

In early February, a handful of Cox employees were online for alpha tests of @Home. The waiting list for the service stood at 1,800 customers. Like Southwestern, Cox's headend features state-of-the-art server, router and distribution systems.

No matter what the new service, Cox believes "there needs to be both a value enhancement and a tie to the older core services," says Art Reynolds, vice president of new product development. "With Sprint PCS by Cox, for example, you get an added value if you're a Cox cable customer of simplified pricing."

In that respect, the groundwork is already being laid with consumers to position Cox's brand as a single stop

I-6

The Business Of Business

Although the marketing emphasis for San Diego's cable operators is on advanced residential services, infrastructure is in place to compete for big-business customers.

Time Warner AxS of California LP, a unit of Time Warner Communications, shares a 2,000-mile regional fiber ring with Southwestern Cable TV, passing 1,500 businesses with Synchronous Optical Network, or SONET, transport. The company also offers for digital cross-connect and switched services, the last of which it intends to launch in the next few months.

The testing of its services and the potential for new revenue streams are the focus of its strategy.



identical network, should parent Time Warner give the OK on wireline telephone entry.

"I'm doing a lot of business with Internet service providers, and everyday I sell T1s to people who want to connect to the Internet," says AxS General Manager Terry Churchill.

"We also mention to our customers, 'Hey, our sister company has RoadRunner [cable modem service], and you could access your enterprise and the Internet via RoadRunner, or I could hook up a high-speed connection for the enterprise and interface it with the cable plant and you could enjoy whatever combination of other services features and bandwidth brought to the table by a 155-Mbps SONET. HFC is about to be

RoadRunner, but Fellhauer ordered that a 30-second spot be produced to apologize for the early backlog.

Occupying only 20 percent of the entire market, Time Warner is, for the moment, disadvantaged in terms of mass market promotion of RoadRunner, "but once Cox launches @Home, we'll buy mass media that will help both them and us," Fellhauer says. "We'll have telecommuters living in one system and working in another."

Covering 80 percent of San Diego with a two-way network, Cox says it is ready to roll out one service after another — PCS, @Home, digital television, wireline telephony, long-distance telephony and even its

for communications services.

"We believe the consumer needs someone to help him navigate through all the new high technology," Geppert says. "We're the company you call to come out and service all your in-home communications needs."

To put customer-friendly flesh on last year's \$1 million in advertising, Cox of San Diego offers two-hour service-call windows and on-time guarantees, and has broadened staff expertise.

For data services, @Home is developing a certification program for technicians and will provide second- and third-tier help-desk support. Cox will supply both PC and cable installation staff. ▲