

PGCW's success provides a glimpse of the future in a technical sense as well, because it is based not on "fibre to the premises" but on a less expensive method called "fibre to the node" (FTTN) that is being adopted by many other telecoms firms. This involves running fibre to local exchanges and neighbourhood junction boxes and then, for the final link into the home, using the existing copper phone line, supercharged by a particularly fast form of the "digital subscriber line" (DSL) technology that turns phone wires into broadband pipes.

In this model, television signals travel as streams of IP packets, but because the final broadband link has a limited capacity, it is not possible to pipe hundreds of channels into the home at once and switch between them at the set-top box, as happens with cable and all-fibre networks. Only the channel that is actually being watched is sent from the fibre network down the broadband link. This has the benefit of reducing piracy and providing a far more interactive service, because individual video streams are sent to each subscriber.

Cheap and cheerful

The main advantage of FTTN is that it is comparatively cheap. Mr Bath estimates the eventual cost of connecting each home at \$500-600 for Verizon, which is using FTTP, but only \$250-300 for AT&T, which is using FTTN as the basis for its new network-upgrade project, known as light-speed. Verizon claims that its all-fibre method, although more expensive, is more future-proof; company officials say that FTTN will not, for example, support multiple high-definition streams, which require far more capacity than a copper broadband link can provide.

AT&T maintains that its system will be able to deliver two high-definition streams to each household by the end of next year. Ernie Carey, AT&T's head of network planning, insists that its more interactive approach does more than simply replicate the cable model. "We didn't just want to have a me-too product," he says. AT&T's IPTV service, launched this summer under the name U-verse, is impressive, with lightning-fast channel changes, picture-in-picture browsing of other channels and an elegant movies-on-demand service.

As well as FTTP and FTTN, there are other ways for telecoms operators to get into the television market. When the threat from cable operators first emerged a few years ago, many operators struck resale deals with satellite-TV firms, which was a

quick and easy way to add TV to their service bundles without having to build any new infrastructure. But simply bolting on TV service in this way is clunky. Hence AT&T's new Homezone service, launched during the summer, which allows it to offer an advanced television service in areas where it has not upgraded its network to support U-verse.

Homezone is based on a set-top box that contains a satellite receiver and DVR and also plugs into a fixed-line broadband link. (The satellite content comes from EchoStar's DISH service.) The integration of the broadband connection allows it to offer interactive services such as music and film downloads. Because of the relatively slow speed of the broadband link, film downloads take place in the background, using a "queue and view" model.

An even more conservative approach to television is being taken by BT in Britain, Telefónica in Spain, Telecom Italia in Italy and KPN in the Netherlands. It involves a standard digital-terrestrial television (DTT) set-top box, capable of picking up multi-channel digital TV, with a broadband connection that can be used to deliver IPTV services via the fixed-line network. This enables operators to offer music videos and films on demand, as well as a "catch-up TV" service so that customers can call up programmes they missed. It has the advantage that the basic television service can be provided without the need for any investment. The operator gets involved only in delivering the premium services, such as video-on-demand. BT's Mr Verwaayen says he does not see the point in investing billions just to replicate what cable companies can already offer.

There is no doubt that telecoms firms are technically capable of launching television services; the question is whether they will make any money out of them. "Every single customer I talk to knows the traditional voice service is being dissipated by mobile, by VoIP services," says Nortel's Mr Carbone. "They see revenue loss, and just taking cost out of their network will not increase revenue."

Nortel and other equipment-makers claim that there are fortunes waiting to be made by telecoms operators who jump into television. For an incumbent operator in a typical North American city, Nortel claims, a triple-play bundle including television service "doubles the average revenue per user", thanks to new television revenues and increased uptake of broadband. Television is now the largest growth opportunity for telecoms firms, the com-

pany says, and "will dominate all aspects of a telco's business for the next five to ten years." Alcatel, its larger rival, predicts that there will be 72m subscribers to telecoms firms' TV services by 2010, up from about 5m this year, and claims that operators can charge subscribers up to twice as much by adding television to their bundles.

Exactly what makes IPTV so compelling is hard to explain, says Alcatel's Mr Alwan. He draws an analogy with the TiVo and other DVRs. On paper, they do not sound life-changing: why would you want to pause or rewind live television, and what difference does it make being able to record programmes at the touch of a button? But in practice DVRs have changed the way many people watch television, by allowing them to ignore the schedules and call up their favourite shows in a jiffy.

Keeping up with the neighbours

Similarly, says Mr Alwan, users get very attached to IPTV features such as video on demand, being able to pause a film downstairs and watching the rest of it upstairs on a different set, or searching for programmes featuring a particular actor. "If your neighbour has a TV service where they can watch any show, anytime, without having to think about recording it, how much is that worth?" he asks. "If your neighbour has it, you will want it. It's a very interesting competitive advantage." Hsien-Tan, the chairman of CHT, Taiwan's telecoms incumbent, talks of using IPTV to deliver "e-learning, or banking, or karaoke, which traditional cable service cannot provide".

But Lars Godell, an analyst at Forrester, is sceptical. Vendors' claims for the take-up of IPTV services are implausible, he says; despite a few small success stories, such as Hong Kong, there are still no really large

