



Ground breaking

The deployment of newer broadband access technologies is causing a more rapid development of residential gateways.

“As broadband access has moved from one generation to the next, the evolution of the residential gateway has accelerated,” said Pranay Aiya, Conexant Systems’ director of marketing for ADSL CO, PON and SDSL. Whereas digital subscriber line (dsl) ics took a decade to move from simple modems to full residential gateways, newer passive optical networking (PON) ics have taken two years to go from supporting data access and voice to a residential gateway architecture that also includes wireless networking.

Yet, despite the challenge of developing gateway ics in shorter time frames, chip makers welcome the opportunity the residential gateway market presents. A residential – or home – gateway bridges the broadband network to the digital home.

How residential gateways are bringing more bandwidth to the home. By **Roy Rubenstein**.

The residential gateway core ic – which may or may not include broadband modem functionality on chip – supports routing, voice and video, as well as such interfaces as Ethernet and WiFi.

Telecom operators, such as British Telecom and France Telecom’s Orange, are keen proponents of residential gateways. Orange, for example, had installed more than 5.7million Livebox home gateways by the end of September 2007. Operators can offer subscribers bundled services, such as voice, video and high speed internet, promising increased revenues.

“It is not just data [services],” said Sanjeev Challa, CTO of Ikanos Com-

munications’ gateway products group. “Service providers are looking to provide technology that supports real time traffic, such as voice and video distributed across the home.”

Gateways ics exist for each of the broadband access technologies, including cable, dsl and fibre to the home (FTTH). The hardware also requires packet processing to ensure that voice and video packets are delivered over the home network with the required quality of service (QoS).

Fusiv and Xenon

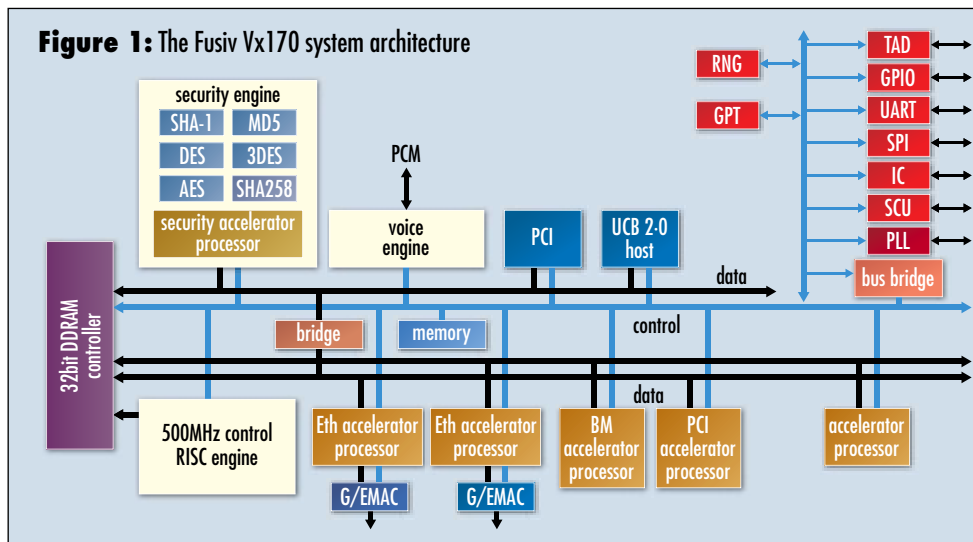
Conexant and Ikanos have both launched residential gateway ics recently. Conexant announced two FTTH residential gateway ics: the CX95202 Xenon-III Giga-bit PON (GPON) and the CX95203 Xenon-III Ethernet PON (EPON) devices. Meanwhile, Ikanos launched two ics: the Vx180, targeted at very high speed dsl (VDSL2) residential gateways; and the Vx170, which supports GPON, EPON and Ethernet point to point FTTH (*see New Electronics, 4 May 2007*).

Henning Lohlein





Figure 1: The Fusiv Vx170 system architecture



One notable difference between the two architectures is that Conexant has combined the PON physical layer functions – the PON media access controller, framer and clock data recovery circuitry – with the gateway hardware on one chip.

“The advantage [of an integrated ic] is performance and cost,” said Aiya. Since

last mile technology, but all the components – the silicon and software – to provide integrated services in the home.”

The Fusiv architecture supports home router functions, such as a firewall and network address translation. The device includes a 500MHz risc processor for the gateway’s general management and several programmable functional processors, such as a dsp for the voice over IP coders/decoders, a security processor and five acceleration processors associated with the device’s various ports.

Intelligent and programmable

“Each application processor is intelligent by itself and is programmable, providing scalability and flexibility,” said Challa. “Each is 16bit and is tuned for content processing and packet routing.” Having such processing engines enables the functions the device supports to evolve over time; a key requirement given the rapid evolution of services and the particular requirements of operators.

Residential gateways are evolving in two directions, said Challa: support for fixed mobile convergence (FMC) and for video.

FMC enables operators to offer fixed line tariffs by coupling the residential gateway with a mobile handset when used within the home. As for video, Challa said: “The residential gateway will be converted into a centralised repository of video content.” Here, the gateway

must act as a networked file share system; even a networked personal video recorder. This will require the gateway to convert between video standards, known as transcoding (see *New Electronics*, 26 Nov 2006). Residential gateways with such capability are likely to appear in the marketplace in 2009, claimed Challa.

Conexant’s ics have a 10Gbit/s processing rating. On the network side, Xenon-III supports GPON data rates of 2.4Gbit/s downstream and 1.2Gbit/s upstream, whilst on the home – client – side, it supports three duplex 1Gbit/s interfaces. Xenon devices use an ARM9 as the control processor, a dsp codeveloped with Mindspeed which supports four VoIP calls, and a packet offload engine. “The offload engine performs all layer three functions,” said Aiya. “Any layer three packet goes directly to this engine.”

Conexant is already looking at next generation PON standards, which will have 10Gbit/s download data rates, but it believes Xenon-III has sufficient bandwidth to support requirements for the next two years. “Home networking technology is such that it will not use all the bandwidth that GPON offers,” said Aiya.

Other differentiated gateway ic features include the ability to reuse software across the various broadband gateway platforms. Conexant’s software platform is identical for all its device architectures, including ADSL, VDSL and PON. The software platform is based on Linux and includes stacks for voice, platform management and wireless networking.

Another differentiating feature is a device’s support for the various interfaces needed, especially given the marked regional differences. For example, the North American market requires support for the multimedia over coax, known as MoCA, while in Europe interest includes powerline and IEEE802.11n.

According to Aileen Arcilla, a senior analyst for networking, broadband and storage systems ics at IDC: “Until the high definition video is great, the voice service works when I want it, I can access the internet at high speed and still get wireless coverage in the home, then these devices are unproven.” ☺

“Service providers are looking to provide technology that [distributes] real time traffic across the home.”

Sanjeev Challa, **Ikanos Communications**

the move to integrated residential gateway ics is happening more quickly, Conexant chose to integrate the two functions within Xenon-III. “As you get into higher bandwidth applications, the interface speeds between the PON physical layer device and the network processing keeps growing. You could become pad limited [with two ics],” said Aiya.

Ikanos, in contrast, separates its residential gateway ics from its VDSL2 and PON PHYs. Long associated with broadband silicon – and VDSL in particular – Ikanos acquired the Fusiv gateway architecture from Analog Devices in 2006. “Fusiv allows us to provide more value to service providers,” said Challa. “Not just