

Time is Money

As they migrate to packet transport, mobile operators explore synchronization options such as IEEE 1588v2.

By Tim Kridel



Like the meter in a taxi, the clock signal in a wireless network ultimately is about money. If the base stations lose timing, handovers will fail and calls will drop, costing the operator revenue.

There's now a new way that timing is money. As mobile operators migrate to packet transport, many of them are leaving TDM infrastructure at each base station simply to provide timing.

"A lot of carriers are keeping an E1 or a DS-1 at the cell site purely for synchronization," said Patrick Donegan, Heavy Reading senior analyst. "That's inefficient. There's a cost associated with that that you need to get out of the network."

And it's a big cost.

"One E1 can cost several hundred Euros per month," said Tuuli Sarvilinna, group product manager for the Tellabs® 8600 Managed Edge System. "If you multiply that by 5,000 or 10,000 base stations, that's a huge amount of money."

Why Not GPS?

At other operators, the E1s/T1s still carry voice and data, but from both a capacity and financial perspective, their

days are numbered. Although those operators know they'll eventually have to switch to packet transport, many are unaware of the sync considerations that come with that migration.

Some operators are considering GPS, which is a mature technology. Its drawbacks include the cost of adding GPS equipment to every base station and the lack of GPS coverage in certain areas, such as inside buildings.

"Reliance on GPS is also a concern for some operators that point to reports of jamming and the U.S. government ownership of GPS," Sarvilinna said.

Fortunately other technologies exist that provide the network-wide clock synchronization necessary for tasks such as handovers. One option is SyncE, which has the Ethernet features of IEEE 802.3 and, thanks to the ITU-T, the synchronization features of SDH/SONET.

The second major option is 1588v2. The IEEE specified 1588v2's protocol suite, including the boundary and transparent clocks. The ITU-T specifies the services available both with and without boundary clocks.

Vodacom is among the operators that currently use GPS but plan to curb further deployment as part of their Ethernet migration.

"Once the access network and core network are based on IP, the 2 options for access are 1588v2 and/or SyncE," said Sean Moss, Vodacom principle specialist. "The main advantage of 1588v2 is it can supply phase and frequency over a packet network and is more cost-effective than GPS at every site."

"Any 2 Will Do"

The number of base stations worldwide using 1588v2 will grow from 48,000 today to 1.3 million by the end of 2015, Heavy Reading predicts. That's an increase from 20% of all Ethernet-fed sites today to 43% by 2015.

"My assumption is that 1588 will go on to be the most widely deployed [solution] over the next few years," Donegan said.

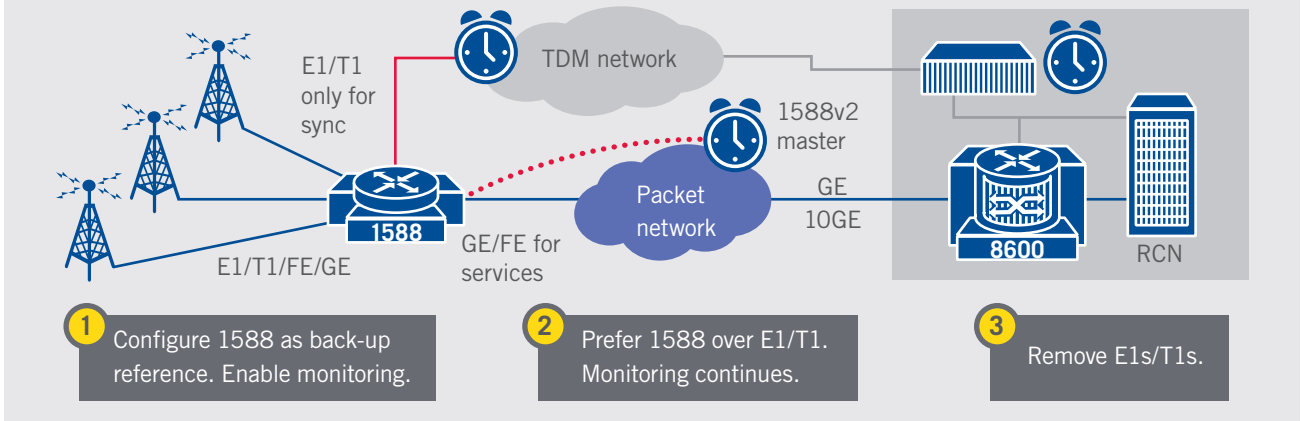
But that's not the same as saying that 1588 eventually will be the only solution.

"A lot of operators will deploy more than one standard," Donegan said. "There is a view amongst many operators that the right philosophy for this transition is 'any 2 will do.' There are circumstances where GPS will work perfectly well, but not deep in buildings. I see pretty strong demand for SyncE, as well."

France Télécom Orange is one example.

"France Télécom Orange is actively investigating SyncE as a first priority and PTPv2/1588 as a second priority," said Sébastien Jobert, Orange expert on network synchronization. "GPS and Galileo may also be considered for specific cases. With a longer term perspective, it is expected that

FROM E1/T1 TO 1588 IN 3 EASY STEPS.



PTPv2 would also be able to provide accurate phase/time synchronization, possibly combined with SyncE.”

Many operators are waiting for standards work to be finalized before committing.

“Important work is on-going at ITU-T with regards to the definition of PTPv2 telecom profiles,” Jobert said. “This work needs to be finalized to make PTPv2 a mature solution for telecoms applications.”

No New Hardware Needed

Some mobile operators can implement 1588 immediately and with no new infrastructure. They’re the ones that currently have the Tellabs 8600 system, which has been upgradeable to support 1588 since 2007.

That upgradeability is why Tellabs currently is one of the few vendors with customers running 1588.

“They have live, commercial deployments, and not everybody does,” Donegan said.

To enable 1588, operators simply load the necessary software into their Tellabs 8600 system.

“The operator doesn’t have to purchase any extra boxes to do packet synchronization in the network,” Sarvilinna said. “Everything is integrated, manageable and easily rolled out. We’ve focused on making that migration as painless as possible.”

An operator taking sync from the TDM infrastructure can now use the Tellabs 8600 system’s monitoring features to trial 1588 on the live network without site visits or risk of disturbance. The operator can use the Tellabs® 8000 Intelligent Network Manager to configure, measure and

visualize 1588 performance network-wide and drill down into the detailed TIE plots. Once the 1588 migration is complete, the Tellabs® 8000 Intelligent Network Manager continues to monitor 1588 health using packet metrics and TIE/MTIE measurement on sites with a reference.

“They can monitor it on a large scale for performance issues before actually throwing the switch and having the base stations take the clock from the 1588 client,” said Kenneth Hann, Tellabs principal engineer. “It’s like having built-in measurement equipment on every site.”

The Right Place at the Right Time

Tellabs started planning 1588 support for products such as the Tellabs® 8605 Access Switch in 2007 while continuing to work with standards bodies such as IEEE and operators to refine the technology.

“In 2002, we discovered that we could use Ethernet to carry timing,” Hann said. “We built that into our products way in advance of any activities in the ITU-T. From about 2006, when the ITU-T adopted SyncE, we’ve been a regular contributor to synchronization topics.”

Today, Tellabs is prepared for LTE Advanced, which most operators likely won’t deploy until late this decade.

“Even though it might be 3 to 5 years before they have to accommodate it in their networks, it will be influencing their purchasing decisions today,” Hann said. “They want to have at least an understanding that the equipment they buy today can be software upgraded to support 1588 phase synchronization, which gives them the accuracy they need for LTE Advanced.” ■

GPS: Global Positioning System

IEEE: Institute of Electrical and Electronics Engineers

IP: Internet Protocol

ITU-T: International

Telecommunication Union
Telecommunication
Standardization Sector

LTE: Long-Term Evolution

MTIE: Maximum Time

Interval Error

PTPv2: Precision Time Protocol

SDH: Synchronous
Digital Hierarchy

SONET: Synchronous

Optical Networking

SyncE: Synchronous Ethernet

TDM: Time Division Multiplexing

TIE: Time Interval Error