DISCUSSION CONCLUDING AAS 13-504

STEVE ALLEN was aware that Meinberg's Network Time Protocol (NTP) servers can be re-configured to serve GPS time or TAI instead of UTC. Presuming that these options are a response to customer demand, ALLEN asked how many customers might be exercising these server options. MARTIN BURNICKI replied that is not possible to know; these requirements were raised some time ago and unfortunately customers do not always tell Meinberg what they need to do. BURNICKI thinks that customers just assume that because GPS receivers can provide GPS time, a simple constant offset can be added to also get International Atomic Time (TAI). BURNICKI said that for Meinberg, extra hardware was required to do this, but later versions of GPS receivers could be configured to output UTC, TAI, or GPS time. Customers get what they want, and Meinberg does not know what scale is output. However, one problem that should be kept in mind is that an NTP server is usually expected to provide UTC, and if it transmits GPS time or TAI, there is the potential for differences over the network.

Given the fact that Meinberg is a hardware company, JIM KIESSLING asked whether BURNICKI thought it odd that there is so much focus on network transport when it is "incredibly cheap" to put reference receivers into as many systems as one might want. BURNICKI said that the answer depends on the policy of a company as to whether it wants its own Precision Time Protocol (PTP) server to act as a network master clock. In this case, there is only a single device to be configured to provide, for example, leap second information to networked applications within a data center.

KEVIN BIRTH asked if there are any patterns with regard to the sorts of companies that use NTP versus PTP. BURNICKI replied that the main difference between NTP and PTP is that much more accuracy can be obtained from PTP. There are generally two kinds of customers that use PTP. One kind of customer operates using its own closed-node network with everything under their immediate control, and they use PTP to get improved time accuracy over a small network. The other kind of customer is very large companies having their own large data links which are under their own control. These are the main parts of activity that are currently requirements for telecommunication, where telecommunication companies with networks try to use PTP through the network for device synchronization between their nodes. A keyword here is *femtocells*, for example.[*]

BIRTH asked whether financial deterrence is also influential in making the choice between NTP and PTP. BURNICKI said finances are also a factor, because these companies pay very much money for their private data links, between, say, New York and Tokyo, and there is a prerequisite to yield the highest accuracy with PTP.

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[*] *Editors' Note*: Femtocells are small, low-power telecommunication base stations used in a home or small business.