

The Changing Landscape of the Precision Frequency and Time Marketplace

Interview with David Chandler, senior product manager for Microchip Technology's Frequency and Time Systems business unit

1. Microchip's Frequency and Time Systems (FTS) business unit traces its roots back to Symmetricom and Vectron and several other timing companies. These companies were mostly focused on telecommunications and aerospace and defense. Are these still primary areas of focus for your business today?

Yes, the telecommunications sector is still a major focus for our team. The telecom sector pushes us to stay on the cutting edge of precision time generation and distribution. The need to provide assured timing in 5G and 6G networks during Global Navigation Satellite System (GNSS) outages is driving us to develop new solutions like Coherent PRTC (CnPRTC). This will substantially improve network time resilience and performance by ensembling cesium clocks over a distributed network. An ensemble of clocks essentially creates one super-clock reference that is better than any of the individual contributors. Ensembling has been a technique used by national laboratories in their time scales for years, but the clocks have always had to be collocated. With the recent introduction of the High-Accuracy Time Transfer (HA-TT) capabilities of the TimeProvider® 4500 grandmaster (TP4500), we can use proprietary time-scale algorithms across a distributed network. Our Technical Fellow George Zampetti will be giving a talk this week about our progress on CnPRTC Day 3 of the conference, at 9:55AM. On the aerospace and defense side, the push for GNSS resilience continues to drive our product development as we develop atomic clocks with smaller footprints and higher performance. We have achieved several milestones in our Chip Scale Atomic Clock CSAC 2.0 project this year, which is focused on reducing the size, weight, power and cost (SWaP-C).

2. Has the emergence of the "New Space" industry resulted in new opportunities for growth, and has it changed the way you approach the space market?

New Space is certainly a growing market, and we are seeing the time from concept to launch and the mission durations themselves are much shorter. The industry favors improvements in lead time and cost over the completely risk-averse approach that has dominated the traditional space industry. At the beginning of the New Space era, we saw some companies sending purely commercial off-the-shelf (COTS) solutions into space with mixed results. The industry has matured, and we now see a more nuanced approach where products must still demonstrate that they can survive launch and operate in a low Earth orbit (LEO) environment, but our customers are willing to accept off-the-shelf qualification data. There is an emphasis on recoverability from radiation events rather than complete immunity. The new version of the space CSAC that we released addresses these missions, as do our L-series quartz oscillators and modules. The ground segment for New Space has also been an area of growth, with both gateways and ground control stations requiring low-phase-noise references for signal transmission and recovery, as well as synchronization to provide precision time-tagging of the data. As New Space focuses on new missions, such as LEO Position Navigation and Timing (PNT) and lunar missions, the requirements for time and frequency products for both space vehicles and ground segments are becoming more demanding because of either increased precision requirements or weaker signals.

3. Can you provide examples of other industries where Microchip FTS is growing?

Data center growth has been phenomenal for us. Our cesium and network time protocol (NTP) products have been present in data center environments for over a decade. With the increasing number of data centers and servers within them, our precision time protocol (PTP) products are receiving more attention. Many operators are looking for precision terrestrial time sources instead of GNSS and are connecting to national terrestrial timing networks. These networks are another area of growth for us, both for the reference clocks needed at the laboratories and for timing distribution. Our TP4500, with High-Accuracy Time Transfer (HA-TT), is a well-suited solution for delivering single-digit nanosecond precision across an entire country using existing fiber.

4. You mentioned GNSS time and that many industries are looking for new solutions to either replace or at least supplement it. Can you provide an example of a specific industry that is facing a significant challenge today?

The most obvious one is civil aviation. Governments have spent billions of dollars this century upgrading air traffic control and onboard navigation systems to work with GNSS. This has been a game changer, increasing situational awareness in both cockpits and control towers as precise updates are provided rapidly through ADS-B. However, with the massive increase in GNSS spoofing and jamming, civil aviation needs to move rapidly to new solutions that can supplement ADS-B. Simply falling back on the old surveillance and navigation aids is not a solution, as many of these have gone offline or were not designed to handle the volume of air traffic flying today. I will be discussing this topic at the conference on Day 1, at 11:10AM.

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