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Ladies and gentlemen, good morning. It is a pleasure to open the 32nd Annual Precise Time and Time Interval (PTTI) Meeting.

Over the past 32 years, these meetings have continued to provide the timing community with an opportunity for users to present their ideas and requirements for improving the ability of the timing community to meet the nation's needs. Similarly, these conferences have allowed time and time interval providers to make system developers aware of the latest improvements in the field. The objectives of the series of meetings, namely to disseminate and coordinate PTTI information at the user level; to review present and future PTTI requirements; to inform government engineers, technicians, and managers of precise time and frequency technology; and, to provide opportunity for an active exchange of new technology associated with PTTI, are more important today than ever before.

Since the first PTTI meetings, the precision with which time and time interval are measured and transferred has improved by three orders of magnitude, a factor of 10 per decade. We have witnessed remarkable growth in the use of precise time and frequency. It is safe to say that the development of precise time has played a critical role in the growth of technology that touches all of our lives today. The Global Positioning System (GPS) is the prime example of a system based on timing that has had a remarkably extensive impact on all aspects of society. There are many others.

The program for this meeting includes topics that promise exciting, significant developments for the future. Sessions are devoted to issues related to time scales, advances in frequency and timing systems, future timing and frequency applications, telecommunications, utilities, Internet protocol, and GPS augmentation systems. All of these timing applications point out the need to recognize operational standards for timekeeping and time transfer. The Department of Defense (DoD) has clearly realized that the interoperability is a major issue.

It has become evident that standards for time and time interval play an increasingly important role in ensuring that modern defense systems can communicate among themselves without confusion and function effectively. We need to eliminate the costly practice of independent development and nonstandard terminology without regard for the requirement to operate with existing systems and without regard for the likely systems of the future. The U.S. Naval Observatory (USNO) is prepared to assist those who are improving current systems and those who are in the process of developing new systems to provide effective PTTI applications and eliminate needless and extensive duplication. The growing importance of GPS and GPS-based timing is evident. The papers in the sessions of this meeting will no doubt demonstrate the latest numbers characterizing the precision and accuracy of the systems that take advantage of

GPS for timing. The growing use of GPS, however, is not without its own issues.

We know that the dependency on GPS is slowing the development of improved clocks. It is also necessary to consider the requirement for additional sources of precise time and frequency, and the development of possible alternate time transfer methods will definitely be a concern for the future to mitigate the possibility of a single point of failure. Realize, too, that the increasing use of inter-operable systems will demand accurate, as well as precise, time to permit this inter-operability.

Finally, I would like to close with the concern that the PTTI community must continue to challenge system engineers to make use of the potential development of increasingly more accurate time and time interval. While we need to keep track of user requirements for PTTI, we also need to challenge users to take advantage of possible 10-picosecond timing or one part in 10^{16} in frequency.

We often hear that precise time is a utility and that we must recognize the need to manage this new utility to meet society's current and future requirements. Part of this management responsibility is to make sure that users are aware of current and projected PTTI capabilities. National and international laboratories must work together to make sure that the world's timing needs are met and that society can make use of what we expect to make available in the future. I hope that this and future meetings will continue to address these concerns. But, in addition, I would like to challenge users of time to think creatively about new possibilities that take advantage of our ability to provide time and time interval with improving precision. The utility of precise time will in the future provide improvements for us all, and we need to plan now to take advantage of this resource.

Thank you for giving me the opportunity to open this meeting. I know that it will be an interesting and productive meeting for all of us. I would like to introduce Mr. Joe White, who has a presentation.