



OPNT

Optical Positioning, Navigation and Timing

ITSF 2020
Assured Time as a Service

Monty Johnson
4 November 2020



OPNT (Optical PNT) Introduction

- **Netherlands based start-up**, funded by Cottonwood Technology Group in New Mexico
 - Netherlands is a “hot bed” of timing
- **Initial focus on CERN-originated “White Rabbit”** technology: sub-nanosecond time transfer, typically over a single, bi-directional fiber
 - OPNT’s original market aim to extend White Rabbit campus-wide technology to very wide area. E.g. 2018 PNT Advisory Board presentation of US “coast-to-coast”
 - Note that White Rabbit now incorporated as the High Accuracy timing profile in PTPv2.1-2019
- Broadened focus to **“all-in” on global “time as a service”**, with expansion of time delivery offering to cost-effectively meet full range of customers’ use-case needs
 - Government/Critical Infrastructure, Mobile/5G, Financial, Data Centers/Cloud, Public Safety, Autonomous Vehicles
- Participant in **US DOT GPS Backup Demonstration** and **US Executive Order on PNT** in support of NIST



Assured Time as a Service: Framing Propositions

1. With a *satellite independent solution as a requirement*, the **only practical realization path** is through a **wide-area time delivery system over fiber**, and there delivered via **Time as a Service (TaaS)**
2. Resilient operation **requires extensive redundancy at acceptable cost**
3. Given on-going technical progress, commercial realization is primarily blocked by **“Who Pays For?”**



Constraints of Non-Fiber Based Alternatives

- Distance limits for non-satellite cases
- Future Proof Limitations Relative to Accuracy
- **Unassured Resilience!**
 - GNSS aspects well known, including Weather, Indoor, Jamming, and Spoofing
 - Others with Inherent Dependence on GNSS for Base Source of Time*
 - All are One-Way vs Two-Way, Restricting “How Do You Know?”

*TWSTFT (two-way satellite) as the expensive, still satellite-based, alternative to GNSS



Key Enablers to Make It Happen

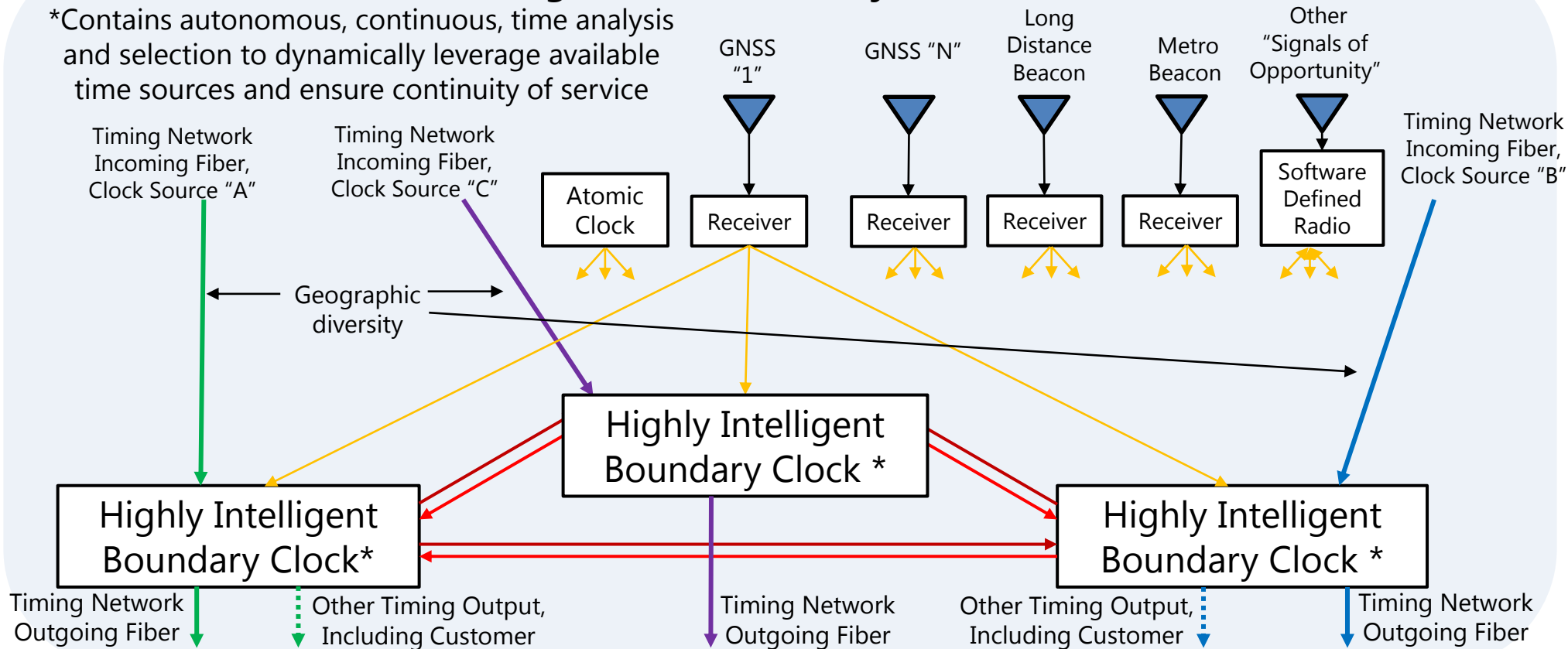
1. Extensive, **real-time, time-handling capability per node**, including assurance and the ability to answer the question “How do you know?”
2. Sufficiently high performance and low-cost per-link time transfer connectivity over fiber, supportable via telecom operators’ existing **Optical Transport Network (OTN)**
3. **Incorporation of wireless**, including in collaboration with other solutions
4. **Time as a Service (TaaS)** business model to enable continually enhancing solution at competitive total cost of ownership
5. **Public/Private Partnership** mechanisms to facilitate establish platform critical mass



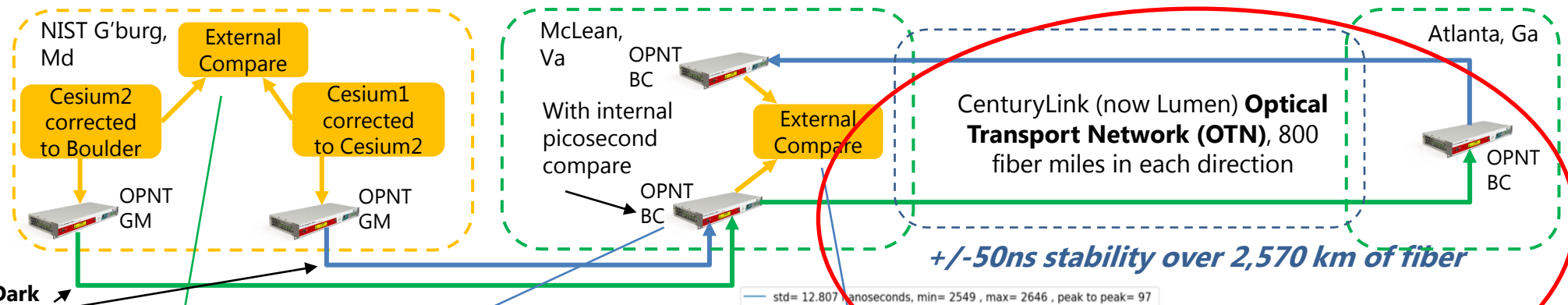
Intelligence and Multimodal Resilience at Every Service Delivery Point

Single Service Delivery Point

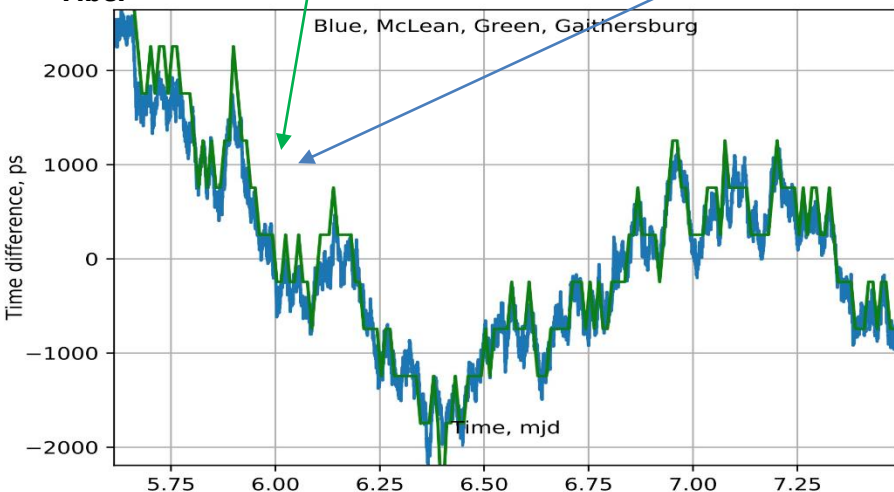
*Contains autonomous, continuous, time analysis and selection to dynamically leverage available time sources and ensure continuity of service



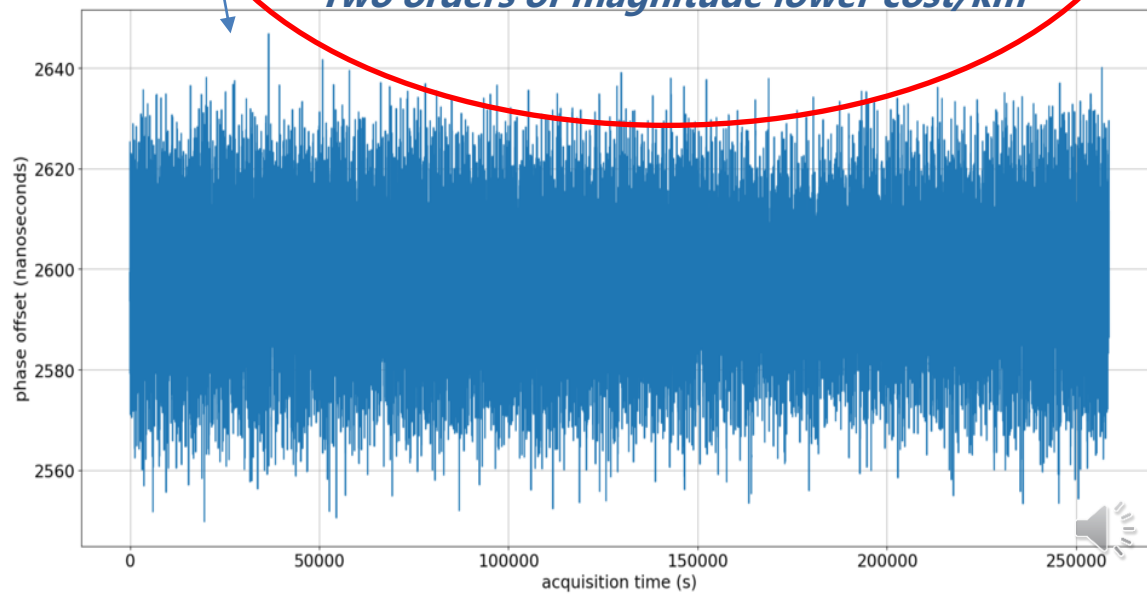
Fiber Connect: NIST Deliverable to US Exec Order including OTN



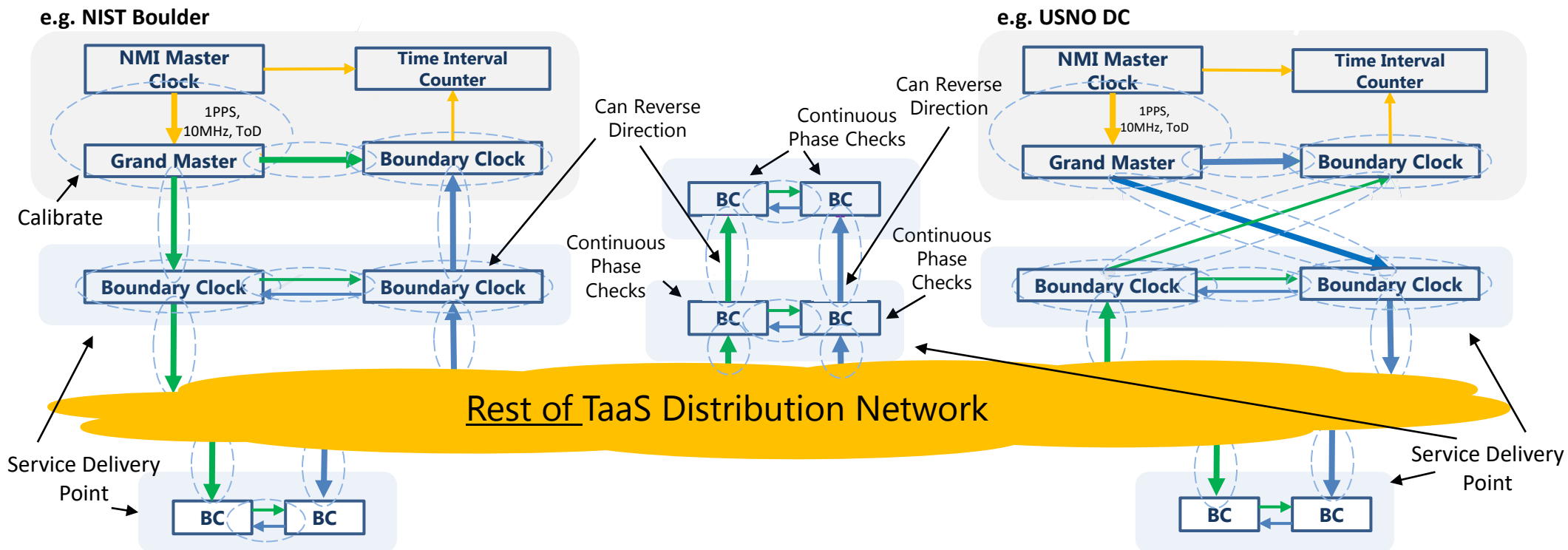
Dark Fiber



Two orders of magnitude lower cost/km



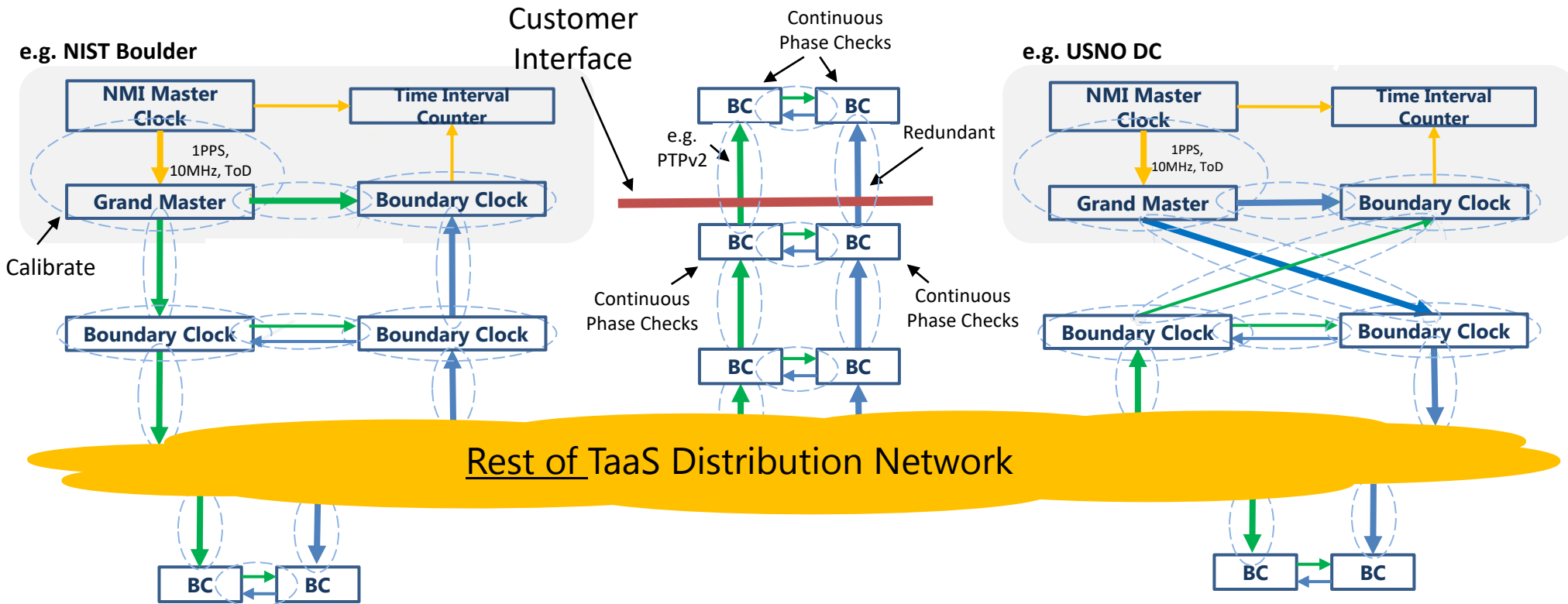
With Dual-Direction / Loop Arounds: "How Do You Know?"



As compared to one-way beacon-based mechanisms, the capability to send and receive time coupled with ability to change direction provides material advantage to establish and maintain veracity

Securely store all of the actions, results, and associated data on TaaS distributed ledger for traceability and other use

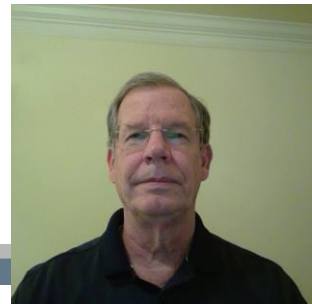
Delivery of Assured TaaS to Customers



Utilizing **same mechanisms as employed within TaaS core** to establish and maintain Veracity to customers, **including ability to secure on TaaS distributed ledger**

Further Still?

- Add customers' timestamp of their data from within their servers, also providing verification of timestamps to DLT
- All with common point of entry for time providers, time users, and regulators
- All delivered to the market as "Compliance as a Service" (CaaS)



Repeat: Key Enablers to Make It Happen

- Optical Transport Network (OTN) to Enable Wide-Area Performance While Containing Costs
- Realtime, Per-Node Link Analysis and Dynamic Management for Traceability, Continuity, and "How Do You Know?"
- Incorporation of Wireless With Collaboration for Extended Access
- Time as a Service (TaaS) Business Model to Continually Enhance Solution at Competitive Total Cost of Ownership
- **Public/Private Partnership mechanisms to facilitate critical mass**

Contact Information



OPNT B.V.

De Boelelaan 1081
1081 HV Amsterdam
The Netherlands

Monty Johnson

m.johnson@opnt.nl
+1 706 206 1963



WWW.OPNT.NL



LinkedIn Follow us



info@opnt.nl