

GETTING
INTO



SYNC

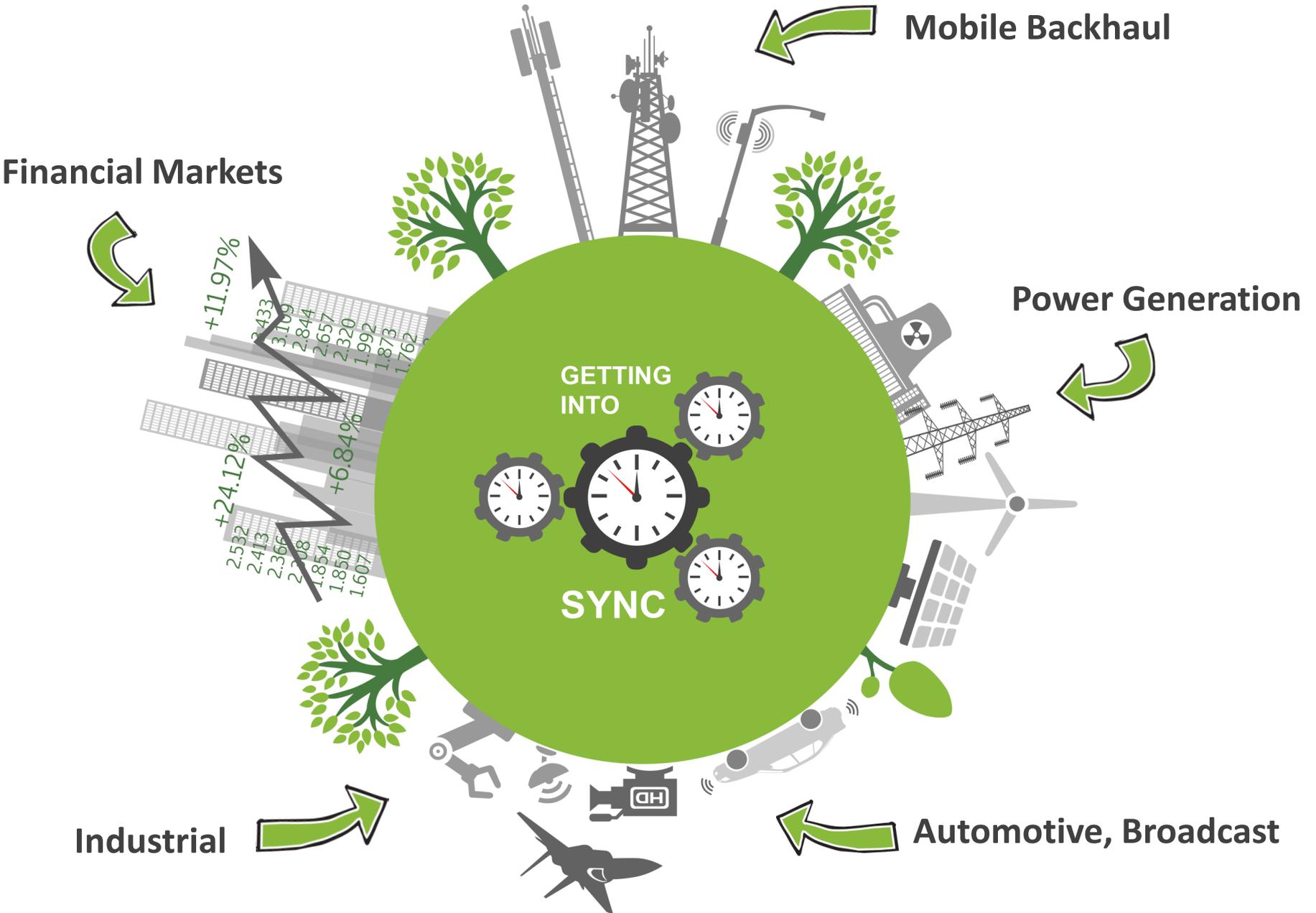
Financial Markets

Mobile Backhaul

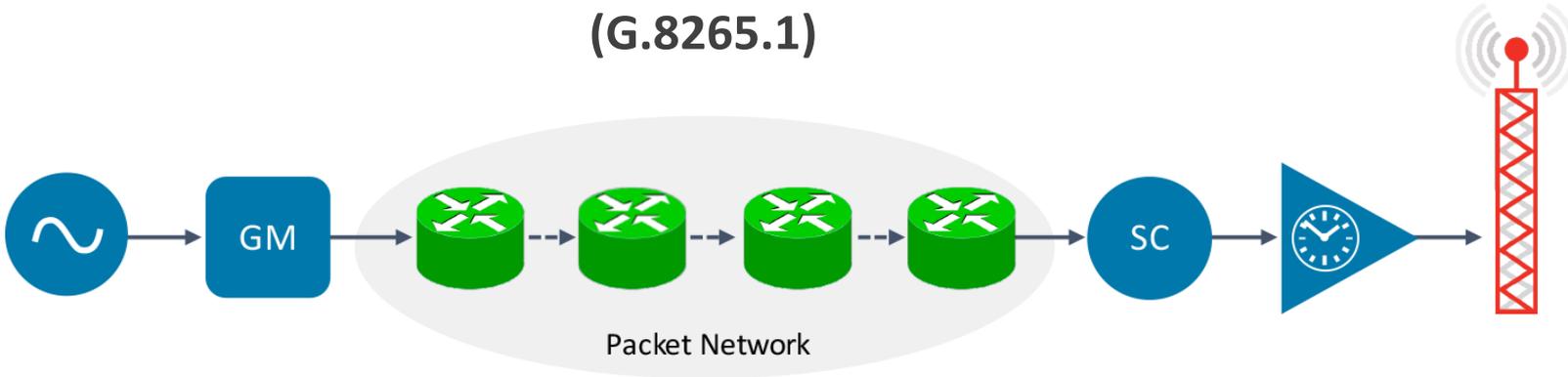
Power Generation

Automotive, Broadcast

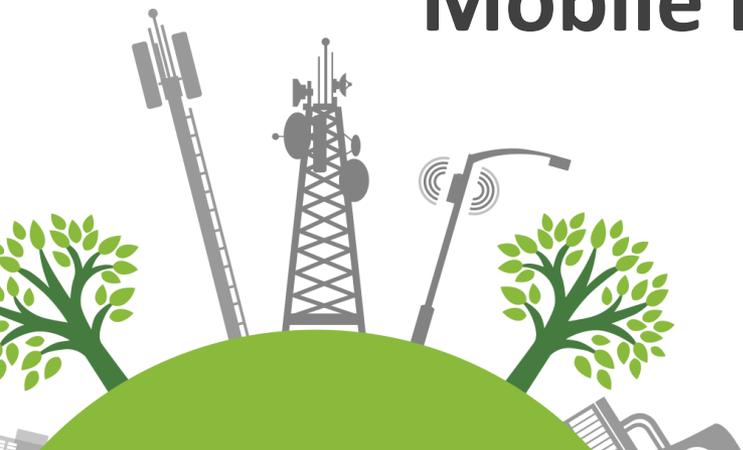
Industrial



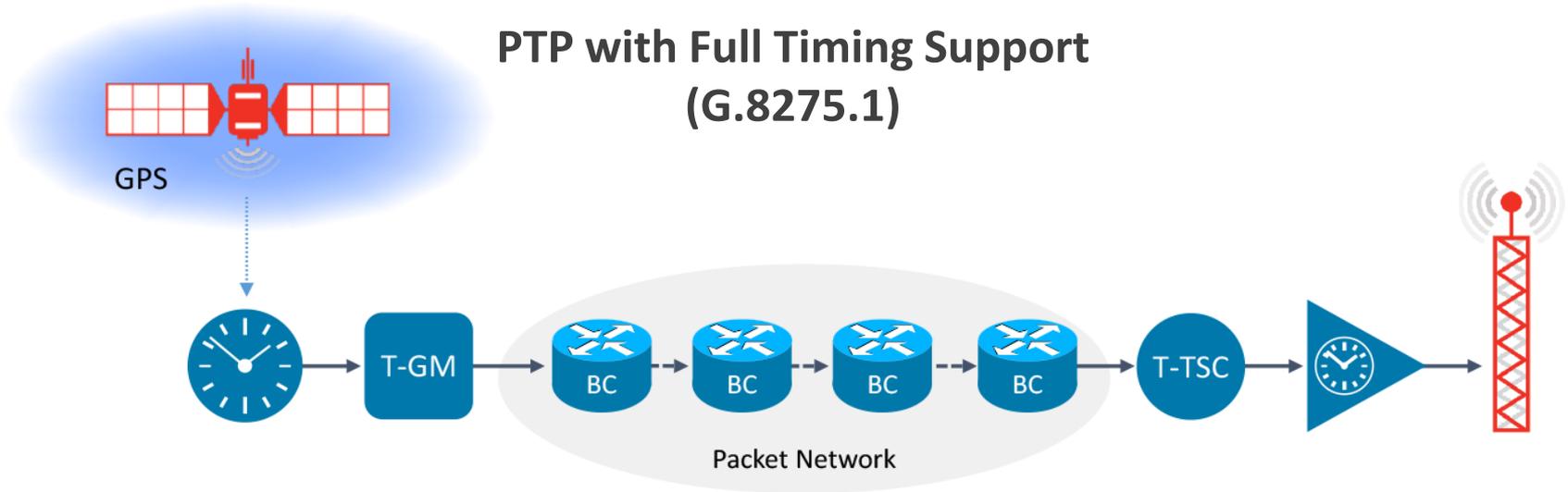
PTP with No Timing Support (G.8265.1)



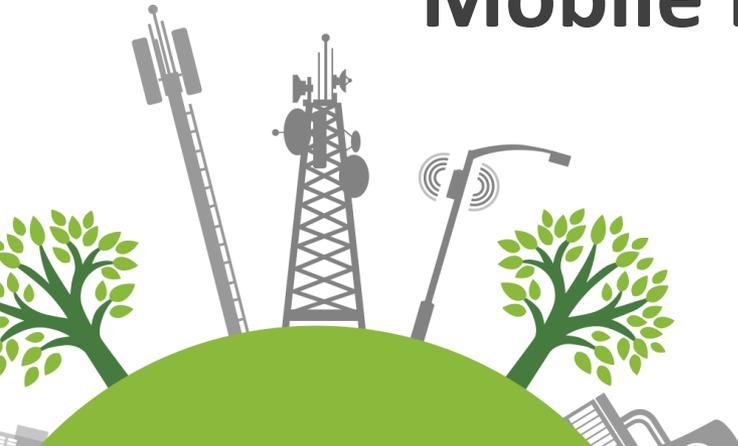
Mobile Backhaul



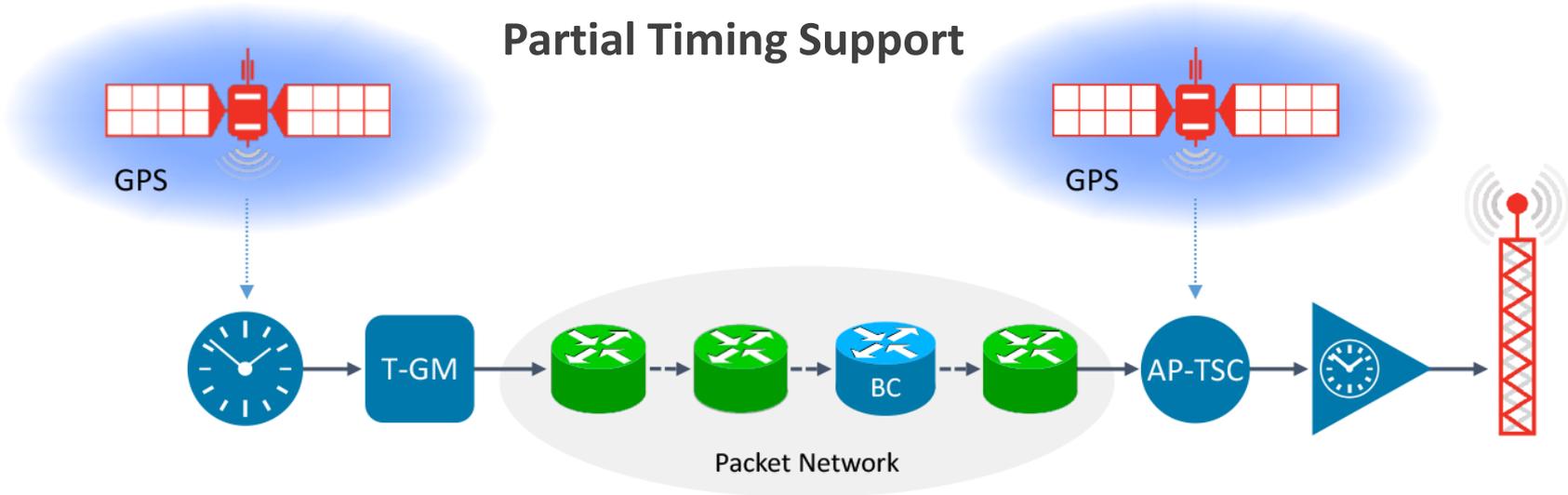
PTP with Full Timing Support (G.8275.1)



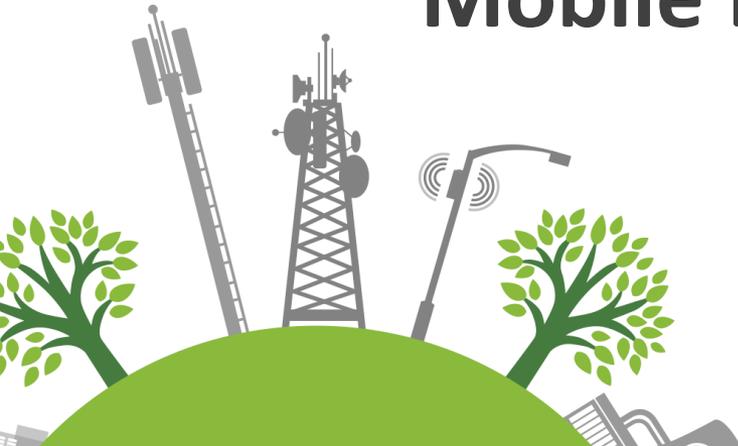
Mobile Backhaul



PTP with Assisted Partial Timing Support



Mobile Backhaul



IEEE 1588 states in clause 19.3.1.1:

"The purpose of a PTP profile is to allow organizations to specify specific selections of attribute values and optional features of PTP that, when using the same transport protocol, inter-work and achieve a performance that meets the requirements of a particular application."

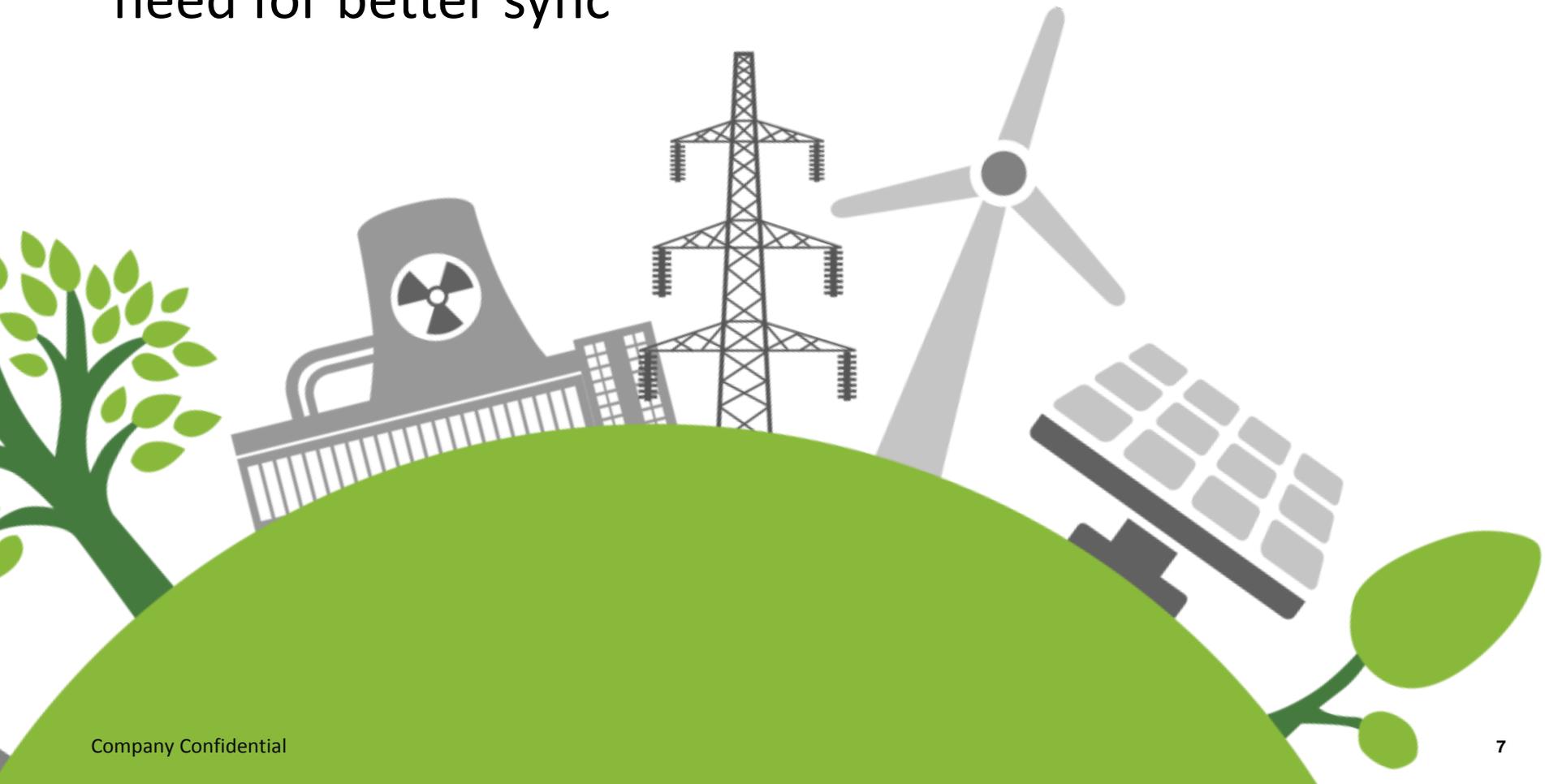
Calnex
Flight and Position

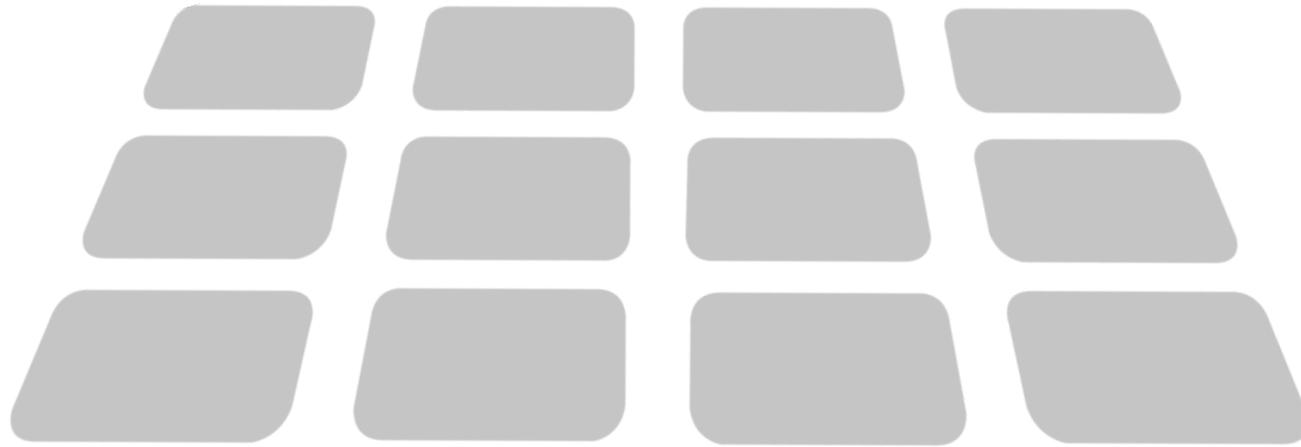
PTP Profile Comparison for ITU-T Telecom Applications

Object	ITU-T PTP Telecom Profile for Frequency (E.622, 1 Annex A)	ITU-T PTP Telecom Profile for Phase/Tone (E.622, 1 Annex A)
Profile Identification	ITU-T PTP Profile for Frequency (E.622, 1 Annex A)	ITU-T PTP Profile for Phase/Tone (E.622, 1 Annex A)
Profile Version	Frequency distribution to better than 10ppb from the network (latest mode)	Time distribution to better than 2.5ps
Profile Identifier	MLT-1 PTP Profile for Frequency Distribution without timing support	MLT-1 PTP Profile for Phase/Tone without timing support
Specified by	1.2	1.0
Location	ISO-15839-01-00	ISO-15839-01-00
PTP Option	MLT-1	MLT-1
Delimiter Node	www.itu.int	www.itu.int
Transport Mechanisms	Ordinary clocks (i.e. Grandmaster, slave-only clock), Boundary clocks, transparent clocks, both master and slave must support IEEE1588-2008 Annex E (L2/L3) and IEEE1588-2008 Annex F (L2/L3)	Ordinary clocks (i.e. Grandmaster, slave-only clock), Boundary clocks, transparent clocks, both master and slave must support IEEE1588-2008 Annex E (L2/L3) and IEEE1588-2008 Annex F (L2/L3)
Multicast or Unicast	Both master and slave must support IEEE1588-2008 Annex E (L2/L3) and IEEE1588-2008 Annex F (L2/L3)	Both master and slave must support IEEE1588-2008 Annex E (L2/L3) and IEEE1588-2008 Annex F (L2/L3)
BMCA	Static BMCA specified (see below)	Static BMCA specified (see below)
Path Delay Measurement	Use of delay_req/request response mechanism, if required (i.e. two-way operation)	Use of delay_req/request response mechanism, if required (i.e. two-way operation)
PTP Management Message Types	Not specified in this version of the profile	Not specified in this version of the profile
One-step and Two-step Clock	Not specified in this version of the profile	Not specified in this version of the profile
Clock Stability	Not specified in this version of the profile	Not specified in this version of the profile
Security	Not specified in this version of the profile	Not specified in this version of the profile
Unicast Negotiation	Not specified in this version of the profile	Not specified in this version of the profile
Two-way Clock	Not specified in this version of the profile	Not specified in this version of the profile
Alternate time-sources	Not specified in this version of the profile	Not specified in this version of the profile
Consistent operation	Not specified in this version of the profile	Not specified in this version of the profile
Alternate master	Not specified in this version of the profile	Not specified in this version of the profile
Unicast traceability	Not specified in this version of the profile	Not specified in this version of the profile
Acceptable master delay	Not specified in this version of the profile	Not specified in this version of the profile
Consistent operation	Not specified in this version of the profile	Not specified in this version of the profile
Other	Not specified in this version of the profile	Not specified in this version of the profile
Message Rates	Not specified in this version of the profile	Not specified in this version of the profile
Sync & Follow-up	Not specified in this version of the profile	Not specified in this version of the profile
Delay_req/request/response	Not specified in this version of the profile	Not specified in this version of the profile
Signaling Management	Not specified in this version of the profile	Not specified in this version of the profile

New Power Generation: the SMARTGRID

Greater complexity and diversity drives the need for better sync





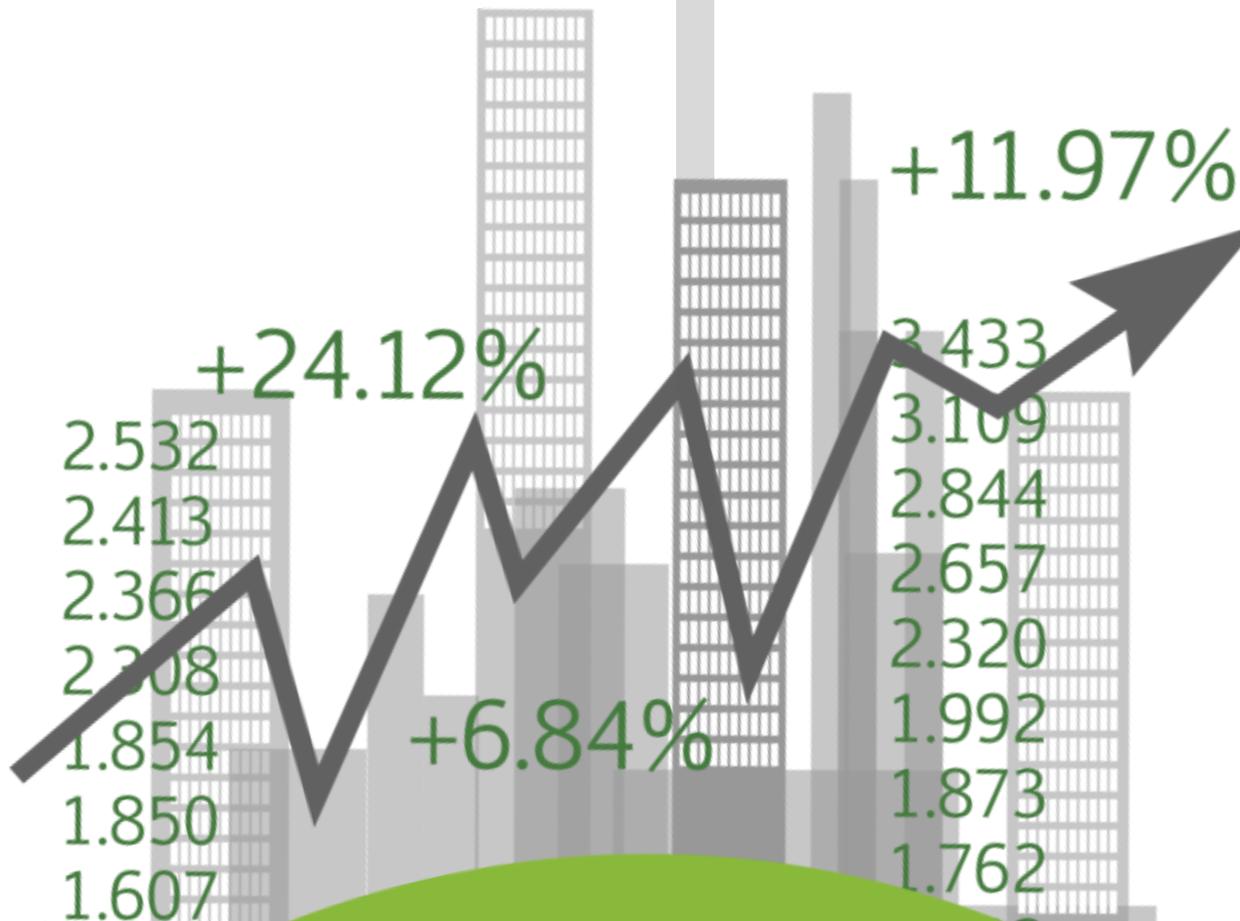
PTP = greater efficiencies + greater diversity

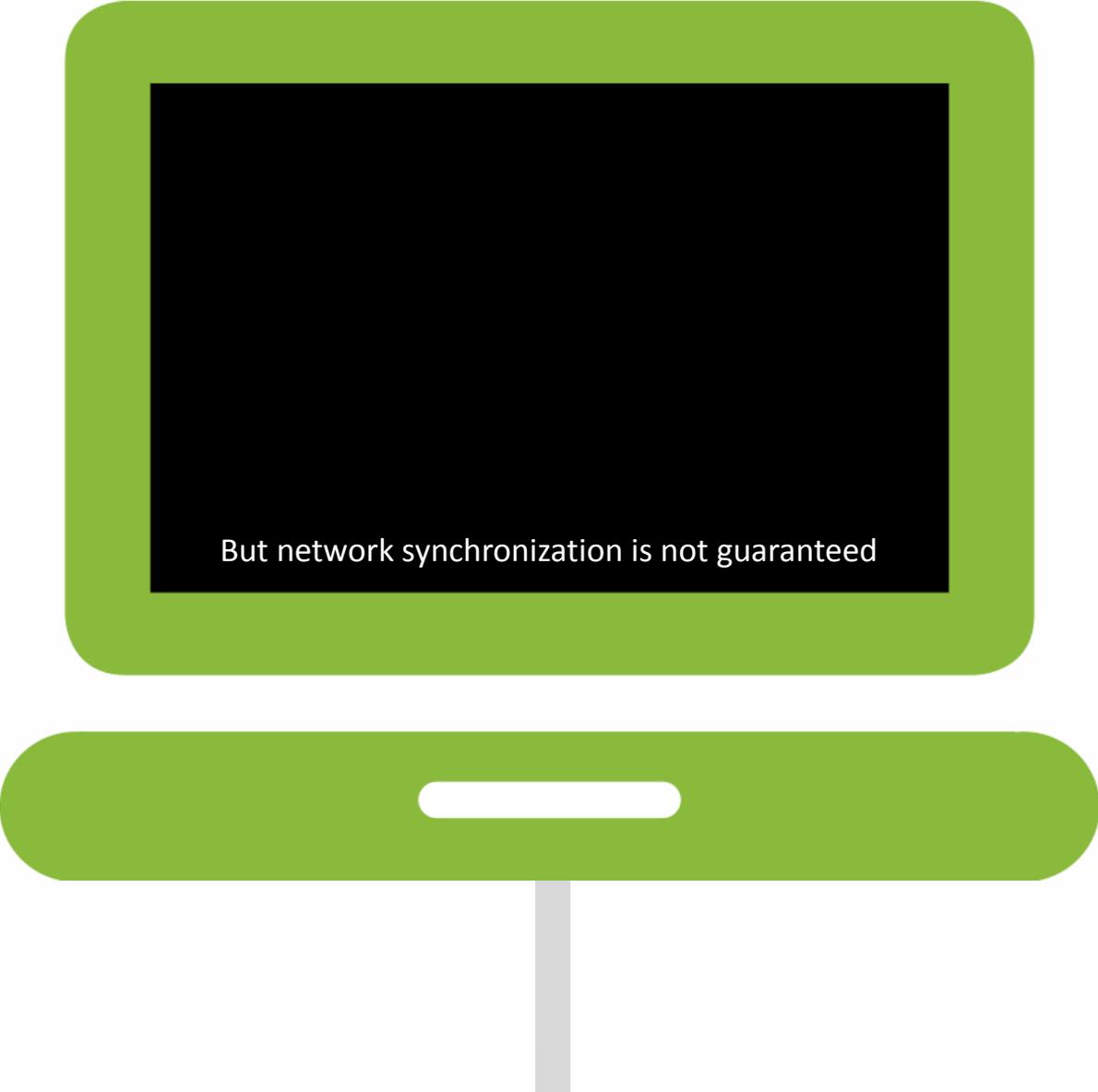
Power Profile IEEE C37.238-2011 currently being aligned with new IEEE 1588



Financial Markets

High-Frequency Trading requires accurate timestamping of trades



A stylized green signpost with a black screen and a white text message. The signpost is composed of a green rectangular frame with rounded corners, a white horizontal bar with a central white oval cutout, and a grey vertical stem. The text "But network synchronization is not guaranteed" is displayed in white on the black screen.

But network synchronization is not guaranteed

Sync is provided primarily by GPS, but . . .

Coverage and signal loss is a significant and expensive issue



Weak security - a US\$20 device can jam GPS signals



The alternative? Timing via 1588 PTP

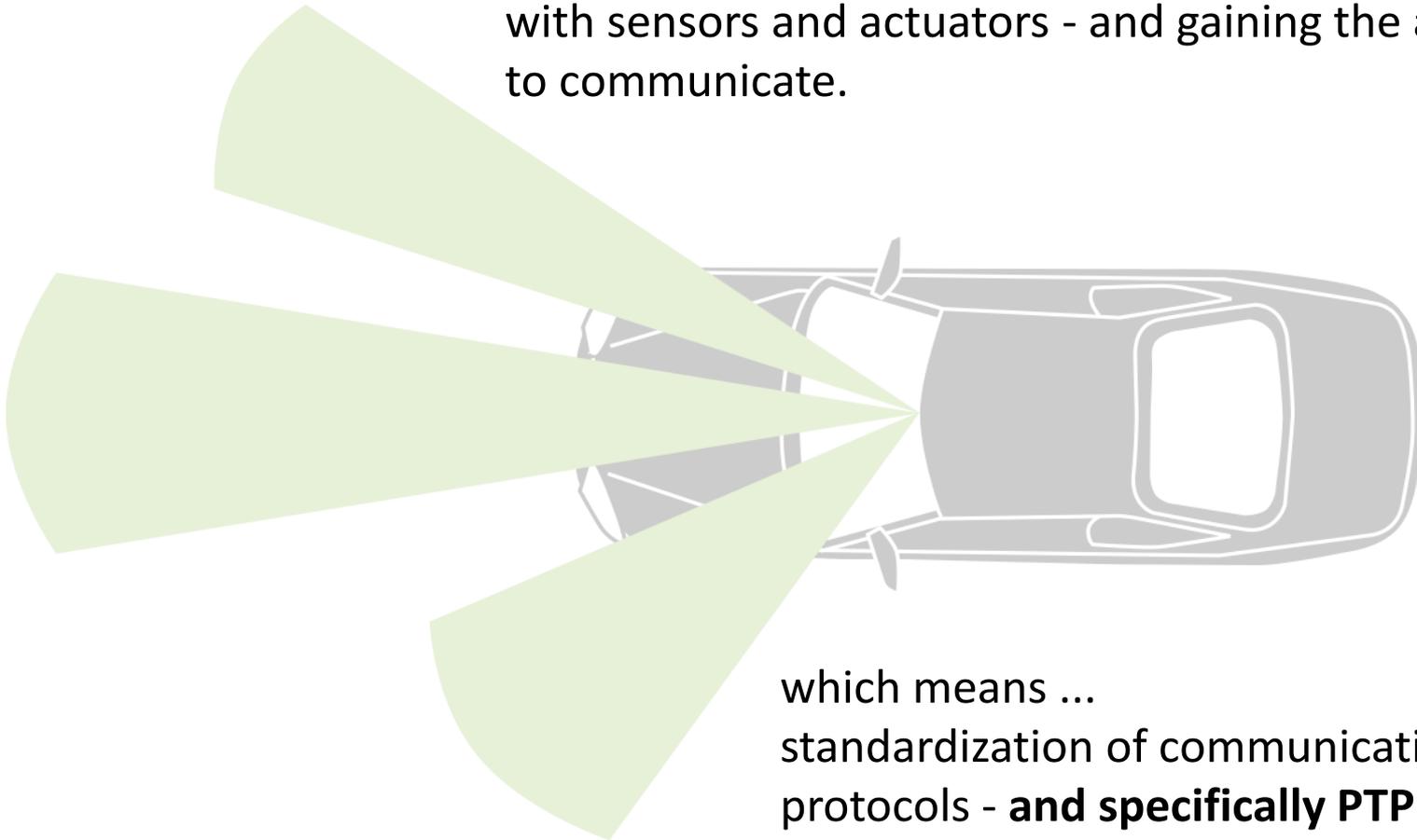
IETF: Draft Enterprise Profile for PTP
(latest version -05, Feb 2015)

Industrial Internet

Time Sensitive Networking



More and more objects are becoming embedded with sensors and actuators - and gaining the ability to communicate.



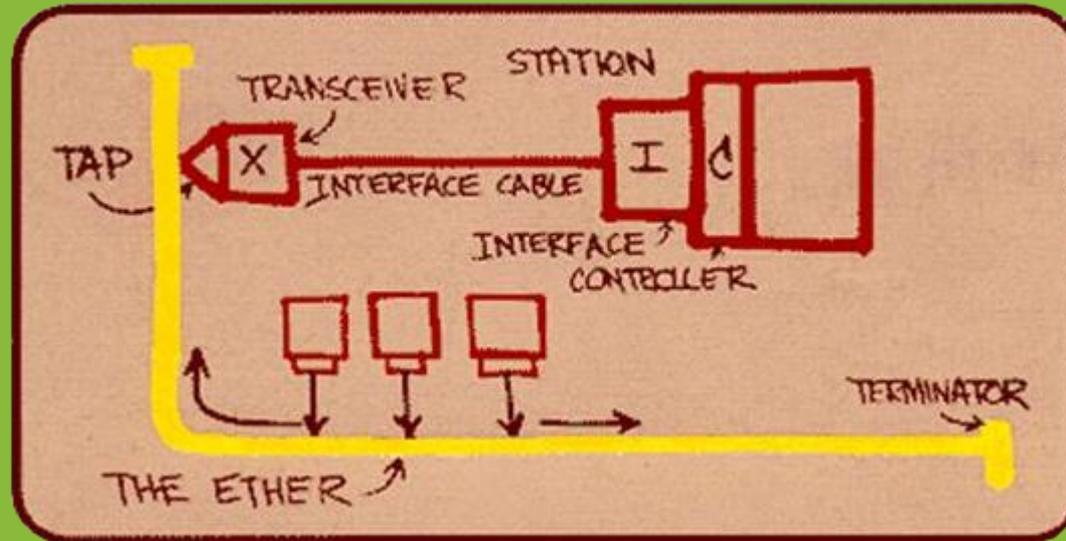
which means ...
standardization of communications
protocols - **and specifically PTP profiles** -
will be required

Broadcast equipment becoming increasingly connected via the Ethernet

SMPTTE standardizing on use
of PTP for synchronization

Draft ST 2059-2: “Precision Time
Protocol SMPTE profile” has gone
to ballot

From modest aspirations ...



Now, Ethernet is keeping the world in sync.