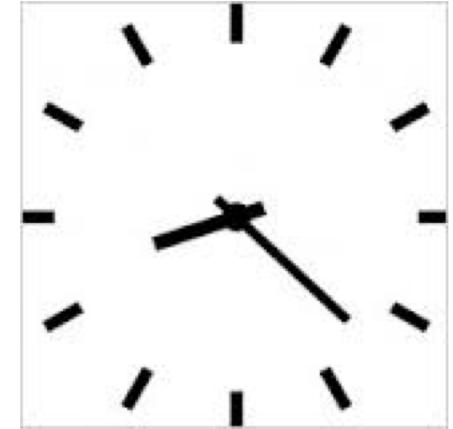


It's About *Time*

PTP and the SMPTE ST 2059 Reference Standard



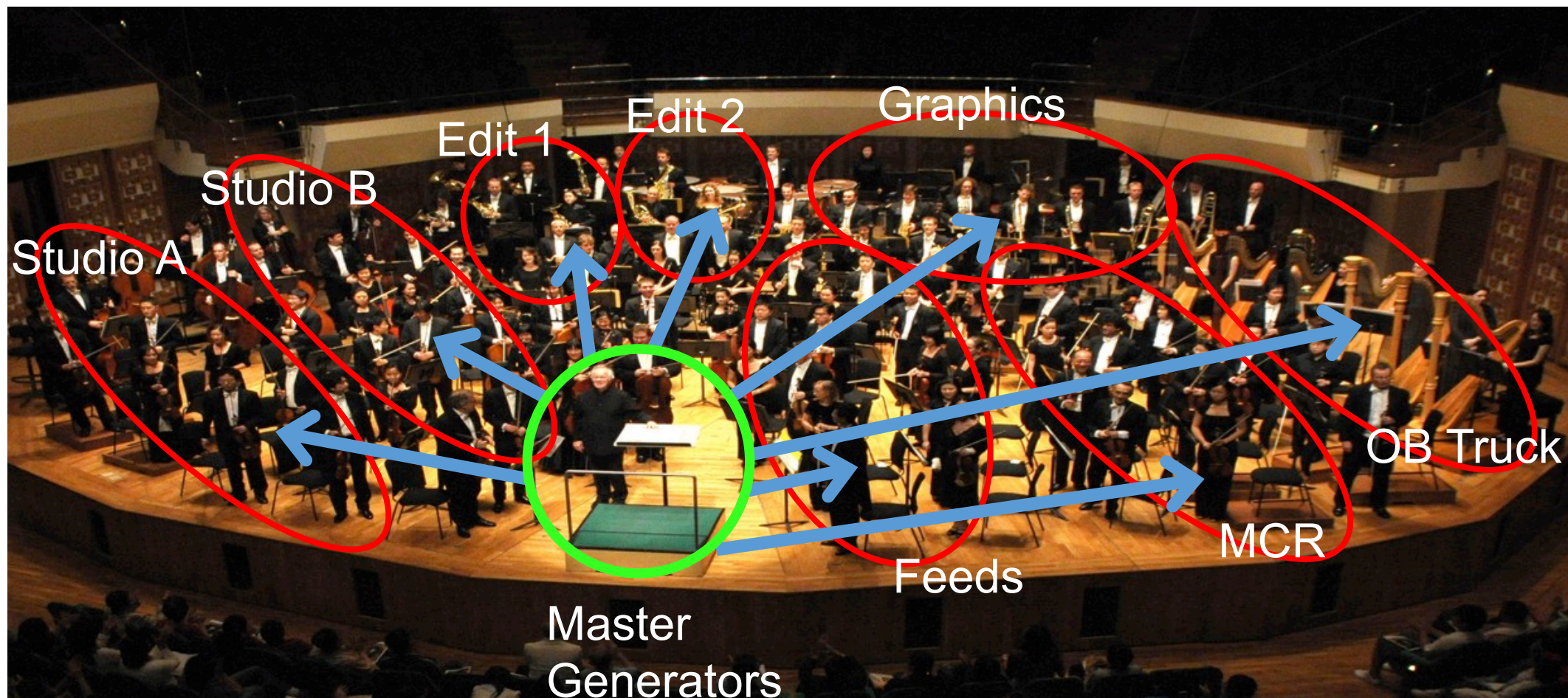
Paul Briscoe,
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Toronto, Canada



Synchronization analogy



Synchronization analogy



Black, DARS, Timecode



Distributing fundamental signals

What we distribute are media signals posing as reference signals

BlackBurst (or TLS) – video with no picture

DARS – audio with no sound

Timecode – Good ol' ST12 (12M to some) longitudinal timecode

What are we really sending around:

Frequency (periodic edges of the waveform) e.g. HSync

Phase (periodic alignment events in the waveform) e.g. VSync

That's all it takes for genlock.

Old-school reference signals

Streaming media signals – native to the formats they synchronize

Easy!

What about IP?

No way to transport these signals (easily)

Want references to live on same network as media

Want to support all legacy media formats

Need to support unknown future formats

What to do?

A new kind of reference “signal”

IEEE1588 Precision Time Protocol (PTP) – a special type of clock

Delivers precision time to many slave devices over network

- Runs on IP (and Layer 2) networks

- Provides for a master (“Grandmaster”) and slave devices

- Offers master and distribution redundancy

- Offers external (GNSS, etc.) lock to frequency and time

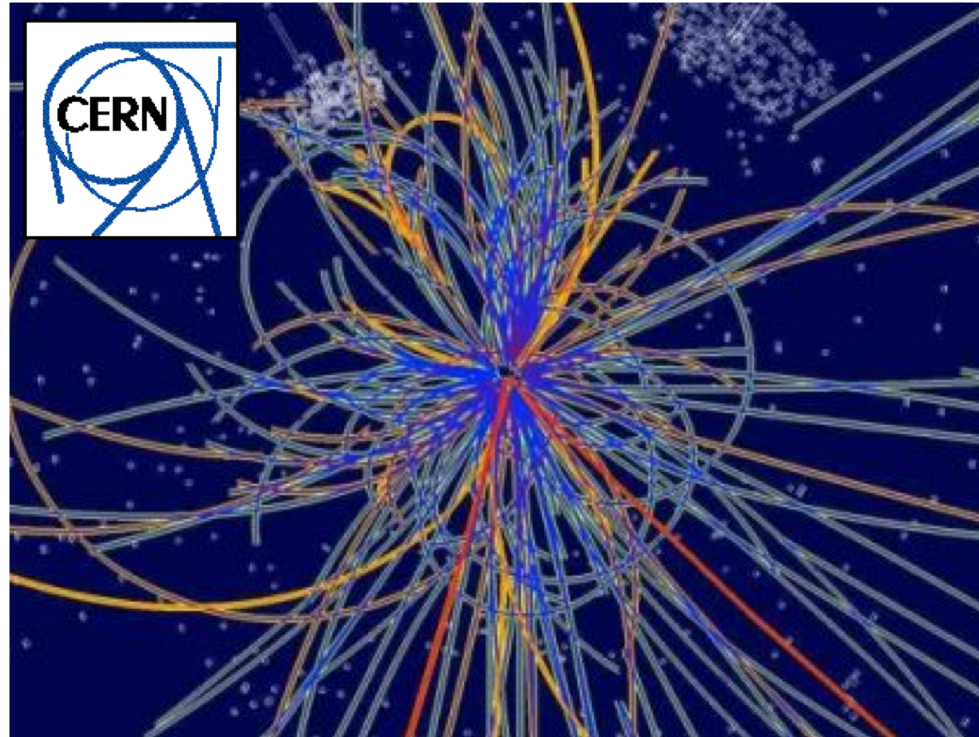
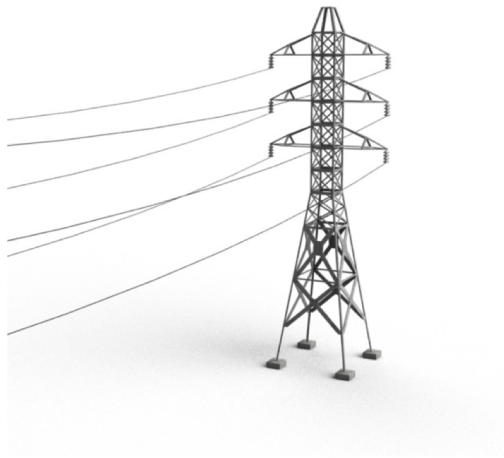
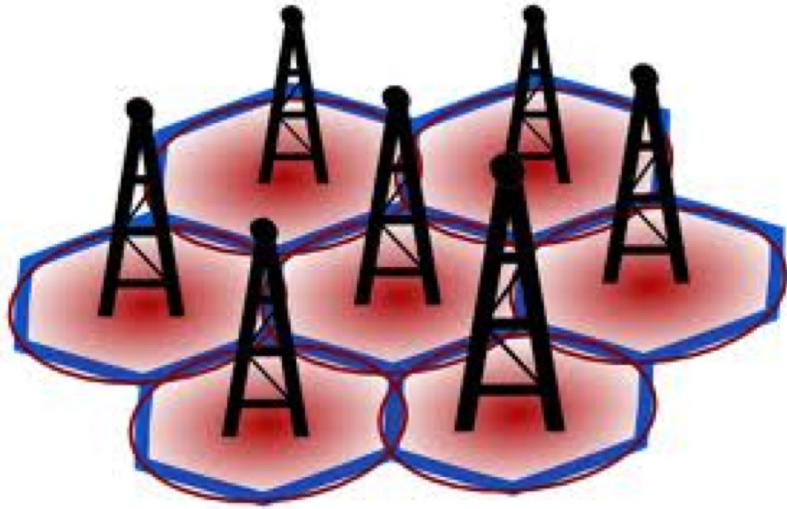
- Can coexist happily with other network traffic

- Network switches can participate to improve performance

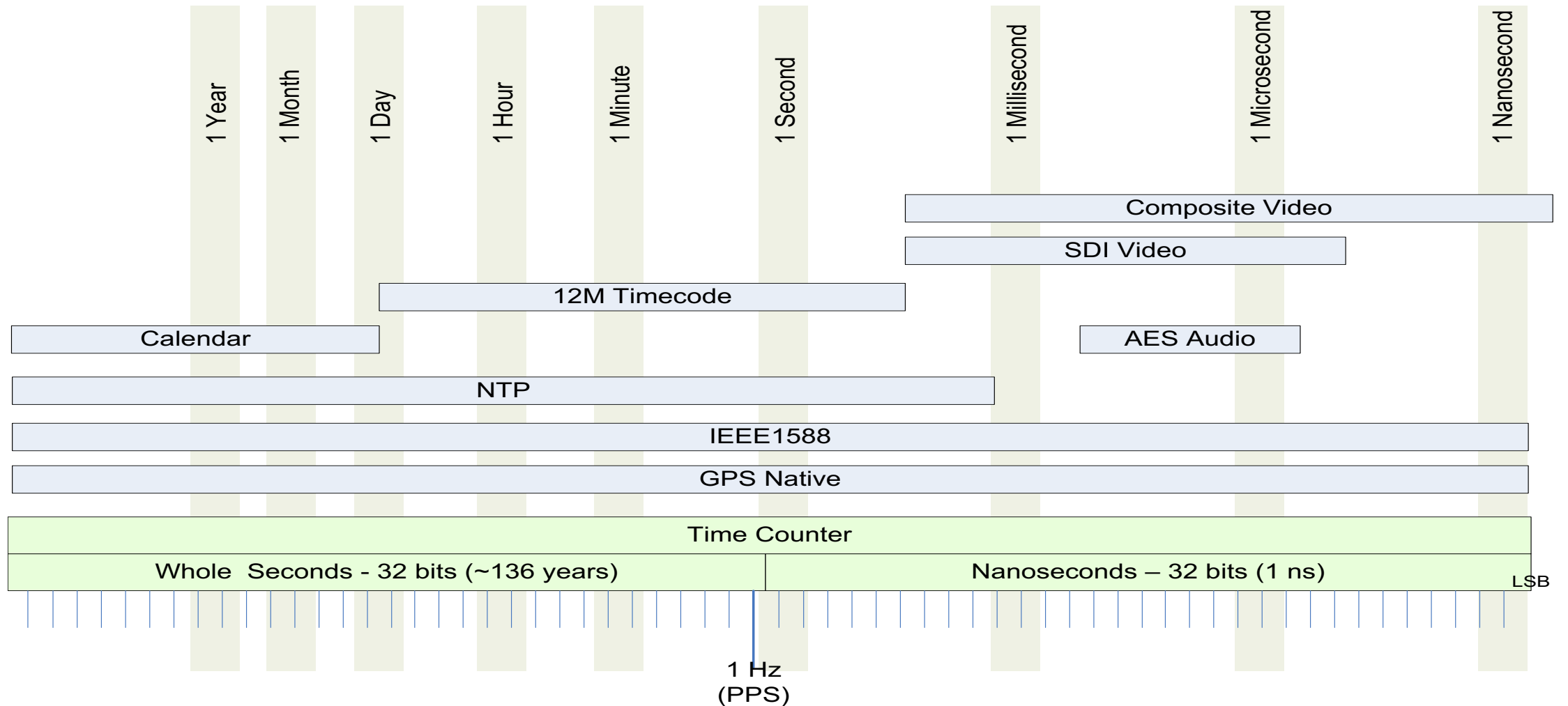
Basically GNSS inside the network

So what? Is this safe? Where’s the frequency and phase?

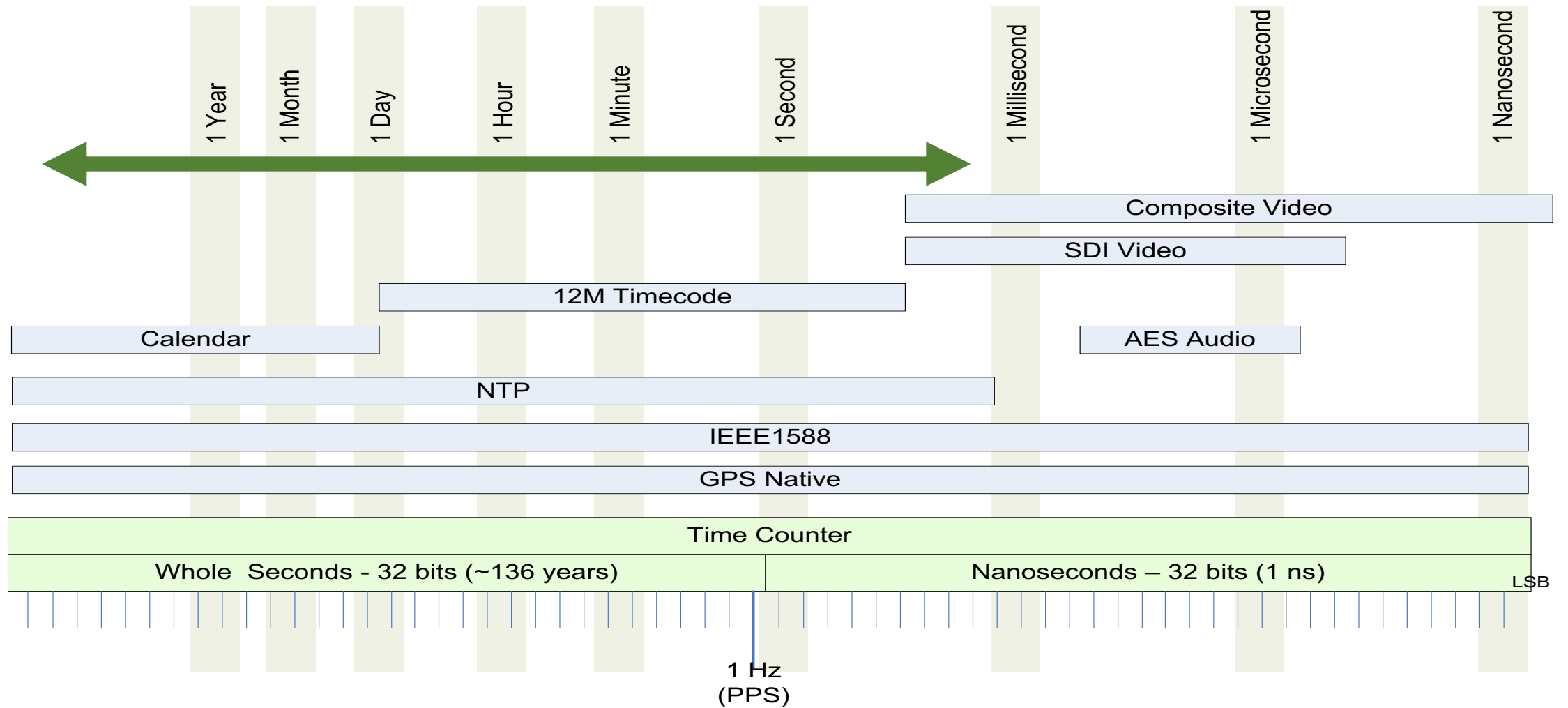
Who uses PTP? Is it safe? Uhhh, yeah.



PTP Span and Granularity



PTP vs. you



PTP on the network

Transmits very small packets

Can be all of either or a mix of unicast and multicast messaging

- Reserved addresses

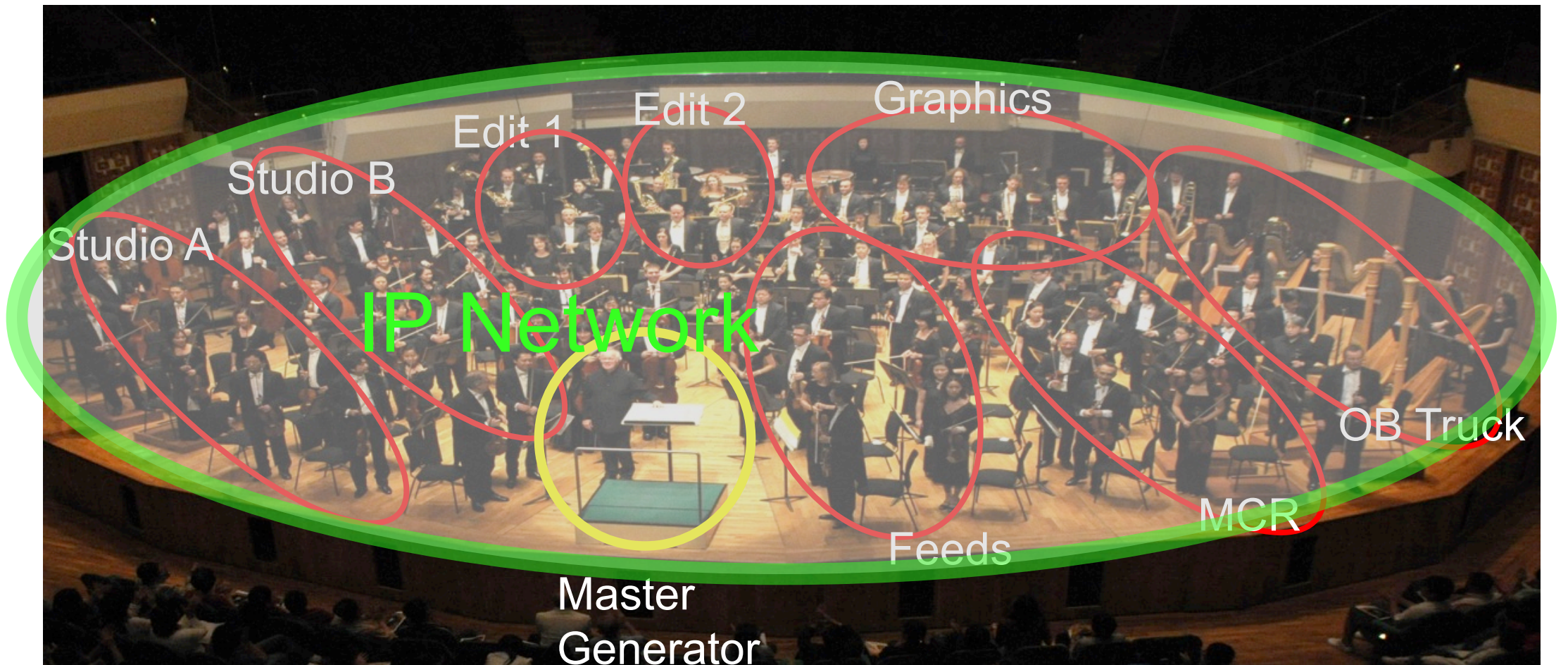
- Specific network domains

Very robust in the presence of traffic

IP switches can provide PTP-specific services to improve performance

So what? How do we use it?

The new opportunity of IP



SMPTE ST 2059 - "Our" flavour of PTP

SMPTE Standard suite for network-delivered references

2059-1 "Epoch and Signal Generation"

Alignment points for interface signals (that exist today)

Formulae for direct calculation of signals from PTP time

Formulae and algorithms for deterministically calculating
ST 12 time-address and ST 309 date

2059-2 "SMPTE PTP Profile"

Specific PTP rules required by SMPTE application

SMPTE-specific helper metadata

Network and SMPTE parameters

Virtualizing references

By specifying the alignment of signals at the PTP Epoch, we can predict their time of alignment into the future

When clocked with a precision timebase, we can forecast alignment for a very long time

PTP locked to GNSS provides the best commercial frequency accuracy available today

GNSS time and frequency enable us to build locked and synchronous systems - anywhere

In summary

Will work happily in hybrid IP / legacy systems

Will enable new workflows on IP

Higher confidence system building

Can be evolutionary or revolutionary as appropriate

Can support any foreseeable future standard / format

Just specify alignment to the Epoch



Thank-you!



ST 2059 and PTP

It's About *Time*

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