GPS independent communication for Smart Grids – Net Insight experience from video broadcast markets

Net Insight – Our background is real-time but for TV and media

- Net Insight is a Swedish public company with head quarters in Sweden
- More than 160 customers in over 50 countries
- Enhancing quality and control of mission-critical services over IP and optical networks using its **Nimbra™ MSR** (Media Switch Router) products

Reasons for GPS independent TV distribution

- Reliability – GPS is vulnerable to:
  - Jamming – intentional and unintentional
  - Spoofing
  - Bad weather conditions (snow, sand)

- Sovereign control
  - US military system

- Key considerations implementing a terrestrial time synchronization solution.
  - Security
  - Reliability
  - Scalability
  - OPEX

Net Insight official Digital TV References

Net Insight has implemented Time Transfer in over 15 nationwide Digital Terrestrial TV implementations

- Norway
- The Netherlands
- Korea
- Germany x 3
- Slovakia
- Finland
- Denmark
- Estonia
- East Europe
- Lithuania
- China (multiple reg)
- Italy (RAS)
- Ireland
- Luxemburg
- Austria

- Mauritius
- Phillipines
- Brasil
- Sri Lanka
- Argentina
- Sweden
- Belgium
- Slovenia
- Eastern Europe
- Cyprus FTA
- Poland
- Cyprus pay-TV
- Marocco
- Middle East country

Time Transfer
= used as primary synchronisation

# Time Transfer was developed for Digital Terrestrial TV

- One box solution - No need for IP/video adapters nor external routers/switches
- <u>GPS independence</u> - synchronizing TV transmitters to send within 1 us time difference
- Multi-service networks
    - Add E1/T1 for digital radio distribution and mobile backhaul
    - Easily handle all IP/Ethernet data and video/audio contribution in same network
- Network protection
    - Rerouting and 1+1
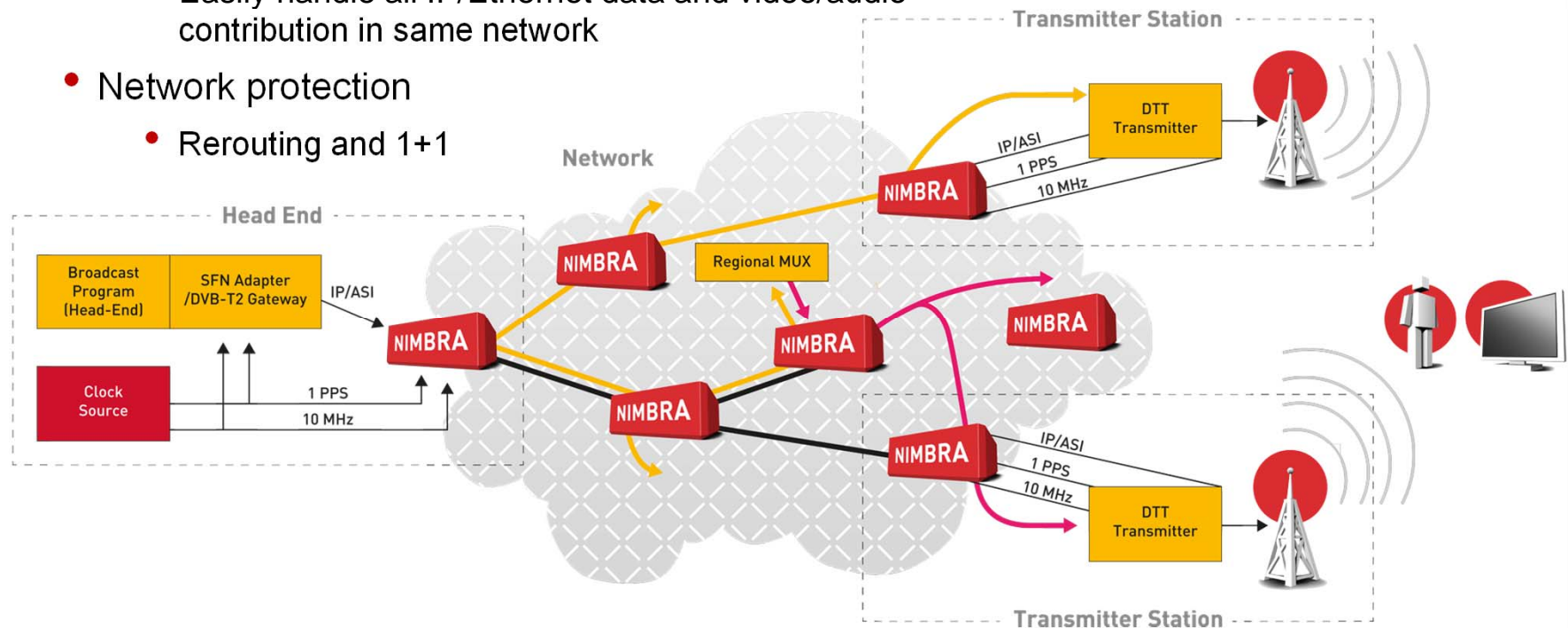
Time distribution for Phasor measurement

- Exact time (~1 us) is critical in power transmission systems
- GPS time distribution is vulnerable to attacks
  - Spoofing, Jamming and weather dependent
- Net Insight offers an integrated Time Transfer function independent of GPS and resilient to cyber attacks due to physical separation of time transfer (control plane) and data plane
- Built-in protection switching and redundancy
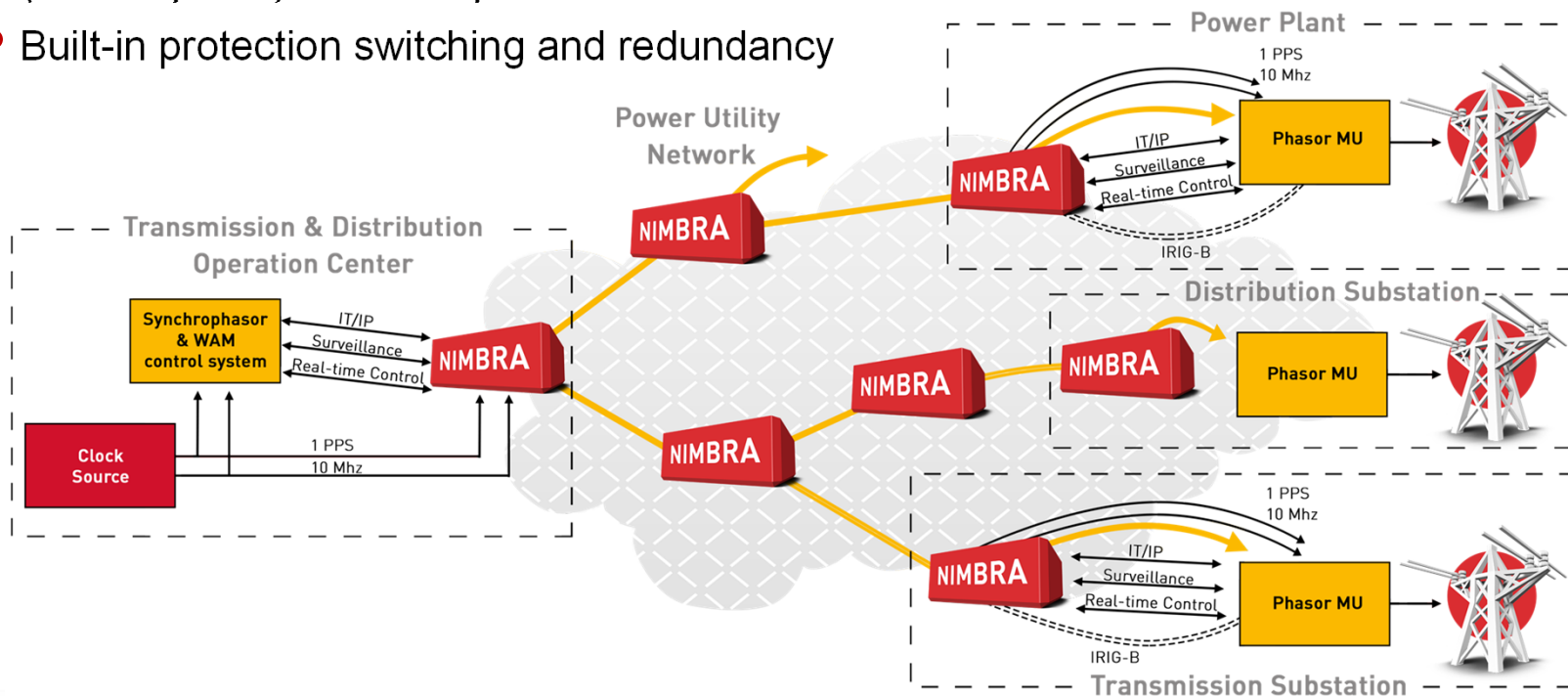
What else can we bring to SmartGrid Networks
Smart Transport for Smart Grids

- **GPS free time distribution using Time Transfer**
  - Spoof and disturbance free time signal distribution (10 MHz and 1 PPS) for syncrophasors and WAMs
  - More scalable and better security than e.g., IEEE1588 in the WAN
    - 15 national network implementations. Handling over 500 transmitters in Norway
    - Complementing IEEE1588 over wide area networks

- **High Security and integrity**
  - Services, including Time Transfer, are truly separated (no interference)
  - Resilient towards service denial and masquerading attacks

- **Real time properties for WAMPACs**
  - Low and predictable delay suitable for tele protection and synchrophasors
    - Real-time control loops (closing the loop)

- **Multi-service network including High QoS video surveillance and PMU collection**

For more information

- Find white paper on Time Transfer : http://www.netinsight.net/Global/Documents/Products/White%20papers/Net_Insight_Time_Transfer_WP.pdf

- Come and see longer presentation on Time Transfer and Nimbra quality and protection mechanisms at DMNTT breakout session

- Net Insight home page (www.netinsight.net)

- Magnus Danielson (magda@netinsight.net)