

#### 24 x 7 Sync Monitoring Case Studies





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## This Presentation

- Why 24 x 7?
- Technology Enablers
- "A month in the life of a basestation"
- PRS Testing/Qualification
- The Future
- Conclusion



Why 24 x 7?

- Tracking down sync problems is difficult!
- They are at the edge of the network
- They require very expensive test equipment
- They are intermittent (Murphy's law says the problem is never there when you are!)
- They require hours/days of monitoring
- They require an expert operator
- They require expert analysis







24 x 7 - ideology

- Fault Monitoring
- Independent Performance Monitoring
- SLA Defending
  - (Easy to blame sync!)
- SLA Policing
  - (Get what you pay for!)
- Data Logging
- Equipment behaviour analysis trending
  - Before and after NGN deployment?)



## Evolution to 24 x 7

1990 1994 1998 2002 2006 **Early SSU** RawTIE **External Post Processing** Import into Excel **Dedicated Solutions** MTIE on the fly **SDH Tester – TIE Measurement options External Post Processing General Purpose Test Equipment (UCT);** Complementary – dedicated MTIE TDEV **Multi Vendor Measurement** and processing Software Multiple UCT, processes data from most common systems **Network View** Key: UCT = Universal Counter Timer Automatic 24 x 7



## 24 x 7 choices

- Integrated in Sync Platform (e.g. SSU)
  - Reporting via NMS
  - Close integration within NMC  $\checkmark$
  - Limited to SSU nodes ×
  - Cost ×
- Independent platform
  - Independence!
  - Installed at problem sites/mobility
  - Cost
  - Looser integration within NMC ×



#### 24 x 7 concept

- Fully automatic 24x7 remote probe
- GSM/GPRS/Wi-Fi/DCN communications
- Monitors & Measures timing impairments
- Data reduction performed on probe
- Stores data on central server
- SNMP/SMS/email when there's a problem
- Management/Configuration via web browser
- Simple to install



# **Technology Enablers**

- Always on, always connected devices (LAN, GSM/GPRS/3G, wimax, wi-fi, Zigbee)
- FPGA/DSP integration
- Embedded Linux
- Ubiquitous Internet/Browser access
- Email/SMS





#### 24 x 7 - the system





# Sync Performance Monitoring





## The Holy Grail!





## 24 x 7 monitoring case study

- A Month in the Life of a Base Station
- Base Station performance could be directly impacted by variations in leased line quality
- Network re-configuration events can be seen down at the Base Station



#### A Month in the Life – 23<sup>rd</sup> March





#### A Month in the Life – 24/26th March





# A Month in the Life – 6/7<sup>th</sup> April





## A Month in the Life – 20<sup>th</sup> April





## A Month in the Life – 2<sup>nd</sup> May





# A Month in the Life – 4/5<sup>th</sup> May





## A Month in the Life – 7/9<sup>th</sup> May





## A Month in the Life...

- Excellent analysis tool for NMC
- Impact of Network re-configuration directly visible
- Permanent record of sync performance





## **PRS Case Study**

- Testing of off-air receiver
- PRS Suitability
- Simple demonstration



### The whole picture?





### The whole picture?





#### The whole picture!





Zoomed in...





#### The whole picture!





#### **MTIE** comparison





#### Periodic behaviour





# What Next for 24 x 7?

- AI event recognition?
  - VC-12 pointer?
  - NE in holdover?
  - Integration with NMS?
- Proliferation of Monitoring?
  - NGN proof of concept?
- Automated Test Systems?



## Conclusion

- 24 x 7 sync monitoring is a vital tool in network management, fault finding and profiling.
- The move to other synchronisation delivery mechanisms will only increase the need for scrutiny



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Thank you, any questions?