

**RLW INC.**

EMBEDDED **SOFTWARE**

[www.rlwinc.com](http://www.rlwinc.com)

Connecting the Physical World to the Internet



## Wireless Condition-Based Maintenance for The Mining Industry

**Presented by:**  
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# CBM: What and why

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- **The maintenance of machinery based on actual physical condition, not clock/calendar, not run-to-failure.**
- ***Objective evidence of maintenance need***
  - Improved productivity
  - Reduce maintenance costs
  - Improved up-time
  - - The EPRI estimates: 15:1 and 6:1.
  - Replacing skills that are fleeting.
  - Noise and other safety issues.



# Baseline CBM Technologies

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- **Data collection with portable devices.**
- **Inconsistent routines and capabilities**
- **Remote processing and analysis**
- **Wired Systems**
- **Do nothing and run to failure**

*Expensive (\$\$\$ & manhours) & Time-Late*



# Customer Needs ?

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## – On-line monitoring

- Interface with legacy or new maintenance/logistics systems
- Open interface
- Pass real-time dynamic and scalar data/information to existing or new systems analysis/display
- Easy to install and configure



# Wireless CBM

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- **Wireless technology is coming of age**
- **The Mining industry is a prime candidate**
  - **New technologies providing expanded coverage (WiMAX)**
  - **Can be cost effective where wired system were not.**



# Wireless Advantages

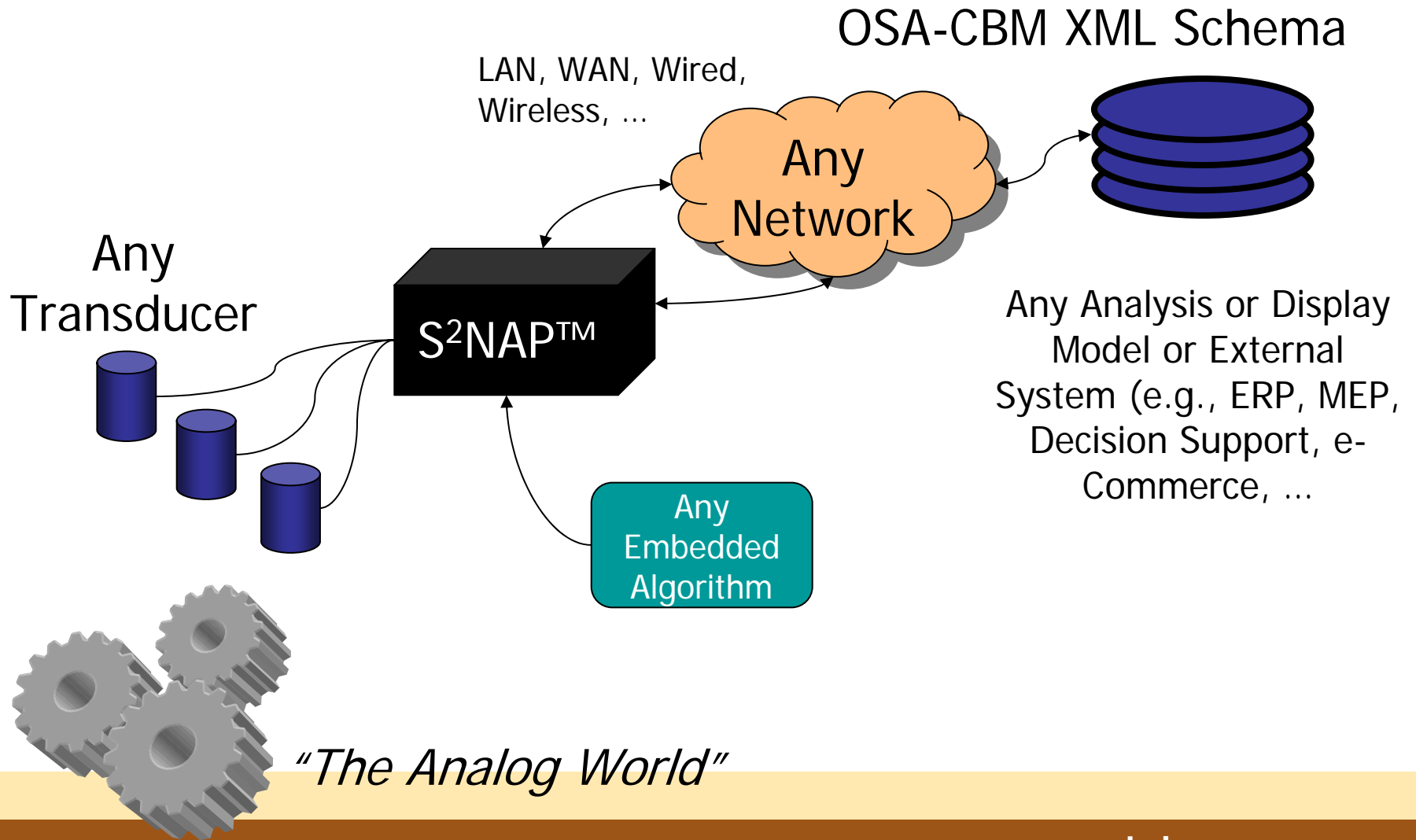
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- **Reduced implementation costs**
- **Enables connectivity to areas and machines that were difficult to access by wire or hand-held**
- **Upgrades connectivity and enables redundancy to and between wired LANs at low cost**
- **System maintenance much lower than wired systems**
- **Wireless structure becomes available for many other applications (human, equipment and inventory tracking, communications, security)**



# An Open Platform for Condition Monitoring

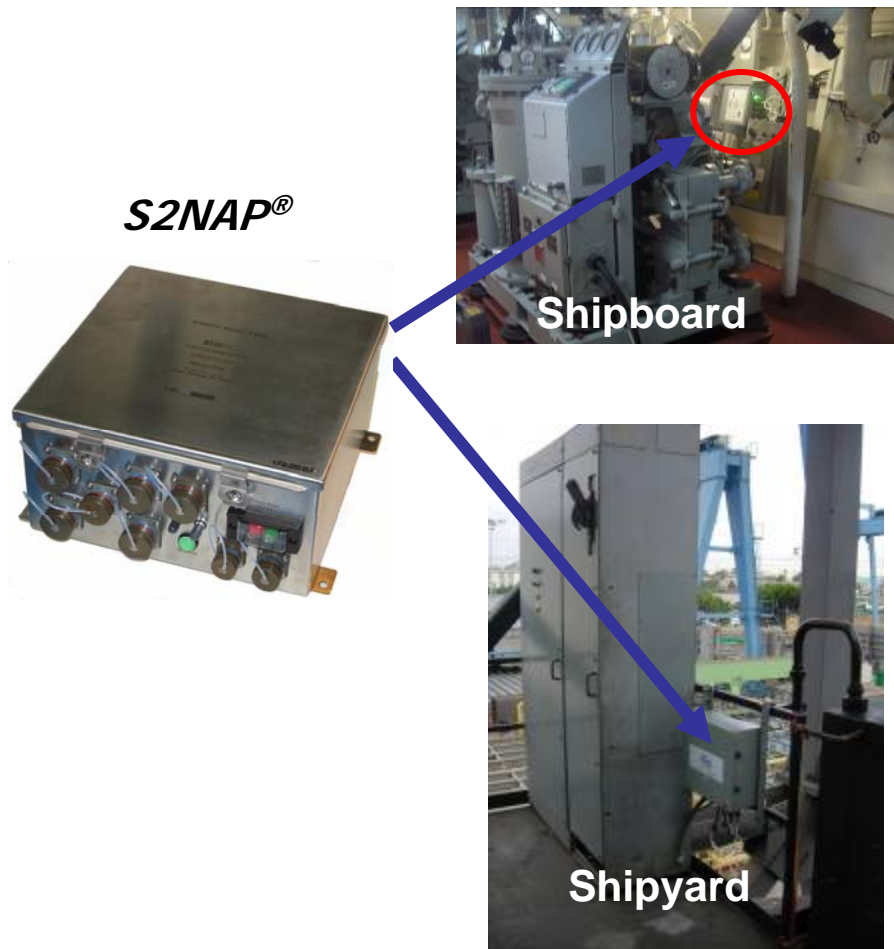
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# S2NAP<sup>®</sup> - Baseline Product

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- XML Interfaces
- 8 Sensor Channels
- Wi-Fi (IEEE 802.11b) Wireless Network
- Mil-Qual Version Available 5/07



# S3NAP™

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S3NAP™

- **2 Channels: 1 Accel, 1 Tach**
- **Supports third party algorithms**
- **High bandwidth data collection – 200 kHz**
- **Collect data only when machine operating**
- **6 month battery life - 2 samples per day**



# Other Derivative Products

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## S5NAP™



### PEO Ships Phase II Option

- Power from ambient vibration (or battery)
- Dual Channel - temp & vibe
- 802.15.4 wireless radio
- Commercial licensing agreement pending

### Commercial Product – Power Utilities Application

## S6NAP™



- Battery-Powered – 2 Year Life.
- 802.11b Wireless
- 2 Channels:
- Raw Data to host computer via connector software
- Network host interface - XML in/out



# Performance Specifications

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<i>Features</i>	<i>Benefits</i>
<b>Processing Power</b>	<b>“Home” for complex algorithms</b>
<b>Wireless or Wired</b>	<b>Low cost</b> <b>Easy installation</b>
<b>Up to 8 input channels</b>	<b>Flexible</b>
<b>Accepts control system inputs</b>	<b>Data fusion w/o duplication</b>
<b>Multiple powering options – line, battery, scavenging</b>	<b>Flexibility by application</b>



# Comparison with Other Options

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Features	Walk Around	Wired Systems	Wireless Devices
Real Time	No	Yes	Yes
Sampling frequency	Low	High	High
Open Standards	Maybe	Maybe	Yes
Cost	High	High	Lower
Ease of Install	Yes	No	Yes



# Summary

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- **Condition-based maintenance saves dollars and improves uptime.**
- **Wireless technology is sufficiently mature to support CBM.**
- **Commercial systems, devices, and software are available.**
- ***Beware of closed/proprietary systems.***



# RLW POCs

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