



# Embedded ARM Technology for Industrial Applications

Presenter: Markus Schoierer,  
Hermann Berg



# Agenda

---

- **MOXA Company Profile**
- **Challenges & requirements for industrial applications**
- **MOXA ARM CPUs**
- **ARM based products**
- **Field of Applications**

# MOXA - Profile

- Private and independent world wide operating company
- Foundation 1987 in Taipei, Taiwan
- 25 Years experience as manufacturer of IT hardware for Industrial Automation
- Today's product portfolio consist of over 1.800 products
- ISO certified (ISO 9001:2000 and ISO 14001)
- Innovative technology and top product quality with 5 years warranty
- Development of own UART / ARM CPUs
- Top references and unique product portfolio for different industries (e.g. Power, Rail, ITS, Defence & Marine...)



# Global Sales and Service Offices



**Moxa USA**

- Sales & Marketing (HQ)
- Product management
- Technical Support
- Administration

**Moxa Europe**

- Product management
- Sales & Marketing
- Technical Support
- Administration

**Moxa India**

- Sales & Marketing
- Technical Support
- Administration

**Moxa China**

- Product management
- Sales & Marketing
- Technical Support
- Administration

**Moxa Asia**

- R&D (HQ)
- Production (HQ)
- Product management
- Sales & Marketing
- Technical Support

# Solutions for the industry:

|                           |   |                             |   |
|---------------------------|---|-----------------------------|---|
| <b>Power</b>              |    | <b>Communi-<br/>cation</b>  |    |
| <b>Oil &amp; Gas</b>      |    | <b>Marine &amp; Defense</b> |    |
| <b>Renewable Energy</b>   |    | <b>ATM POS &amp; KIOSK</b>  |    |
| <b>Railway &amp; ITS</b>  |   | <b>Building automation</b>  |   |
| <b>Factory Automation</b> |  | <b>Medical</b>              |  |

# Industrial Standards

**Power**



IEC 61850-3  
IEEE 1613

**Radio**



R&TTE  
FCC part C/E  
NCC  
SRMC  
Telec

**Hazard zones**



Glass 1 Div. 2/  
ATEX Zone 2

**Marine & Defense**



DVN/ GL/ LR/  
ABS/ NK

**ITS**



NEMA TS2

**Building automation**



UL 60950-1  
UL508

**Railway**



EN50155  
EN50121  
IEC60571

**Medical**



EN55011

# MOXA SBUs (Strategic Business Units)

|                            |  |
|----------------------------|--|
| Industry Ethernet Switches |  |
| Serial/USB/Fieldbus        |  |
| Industrial Computer        |  |
| Industrial Wireless        |  |
| Remote I/O & Control       |  |
| IP Surveillance            |  |
| Power & Transport          |  |

**ARM POWERED**

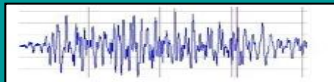
*90% of MOXA products are ARM Powered*

MXview

# Challenges & Requirements for industrial applications

## Hardware challenges:

- Limited space
- Shock & Vibration
- Harsh environment
- High and very low temperature






## Hardware requirements:

- No moving parts
- Reliable product
- Backup ability
- Energy saving
- Easy to recycle
- Low heat
- Long life
- Longterm availability



# MOXA – ARM CPU's



| MOXA CPU   | Core (Size)               | Fab. Process | Speed / Power / Temp                   | Characteristics  |
|--|---------------------------|--------------|--|--|
| <b>MOXA Art</b><br>     | ARM 9<br><br>(27mm*27mm)  | 0.18um       | 192MHz<br><br>1.2 W<br><br>-40 - 85C   | <ul style="list-style-type: none"> <li>- Good for eCOS</li> <li>- μCLinux, Linux</li> <li>- Very good technical support: issues, optimize system, driver porting from x86, ...</li> <li>- Integrate peripherals</li> </ul> |
| <b>MOXA MiiNe</b><br>   | ARM 7<br><br>(9mm*9mm)    | 0.18um       | 25-75MHz<br><br>0.65W<br><br>-40 – 85C | <ul style="list-style-type: none"> <li>- Moxa OS, ultra small footprint (no FS, no MMU)</li> <li>- Low cost (integrated ROM, RAM)</li> <li>- IDE on MiiNePort</li> </ul>   |
| <b>MOXA MACRO</b><br> | ARM 11<br><br>(30mm*30mm) | 90nm         | 500MHz<br><br>0.7W<br><br>-40 – 85C    | <ul style="list-style-type: none"> <li>- Good for eCOS</li> <li>- Moxa Linux</li> <li>- HW-compatible to Intel IXP</li> <li>- Integrate peripherals (PCI, UART, USB, PCIe,...)</li> </ul>                                  |
| Marvel   | ARM9                      |              | 200 MHz - 1GHz                         | <ul style="list-style-type: none"> <li>- DMA Engine for storage</li> <li>- Optimized for “rugged NAS”</li> </ul>   |



# Industrial ARM Platforms (Embedded Computers)

## ARM Platform

- customizable boot loader
  - e.g. fast boot
  - FW recovery (on site)
- Operating System
  - e.g. OS in NOR, apps in NAND flash
  - optimizing packages
  - porting other Linux distributions
- Driver support
  - Interfaces, modules, watch dog, SNMP
- Move to Debian ARM (2.6.38)

## Industrial Features

- Remote Management
  - Moxa Device Manager, API, SNMP
- Application-specific Software Packages
  - Mobile Intelligent Routing Framework
  - Network Attached Storage
  - Solar / FTU / Protocols

# MOXA Application-Ready ARM Platforms

## DIN-Rail/Wallmount



ARM9 and XScale RISC IPCs with a wide Range of Interfaces, LINUX/WindowsCE Platform, and Programming Examples

## Board-Level/Embedded



ARM9 embedded RISC Computing Cores/ Devices with a rich Range of Interfaces, Linux Platform, and Development Kits

## 19 Inch Rackmount



XScale RISC Rackmount PCs with up to 16 RS232/422/485 Ports, WindowsCE / LINUX Platform, Programming Examples

## OEM Designs

- Short time-to-market with an optimal solution, product, and price
- Quick integration for various peripheral devices based on RISC Architecture
- Specifications tailored to Target Market
- Customer-centric development/service

# Customization to meet Customer Needs for Industrial Solutions

- Profession Design Service (PDS) as the concept of Customization service for industrial computing products
- Tailor-made solutions: Hardware & Software



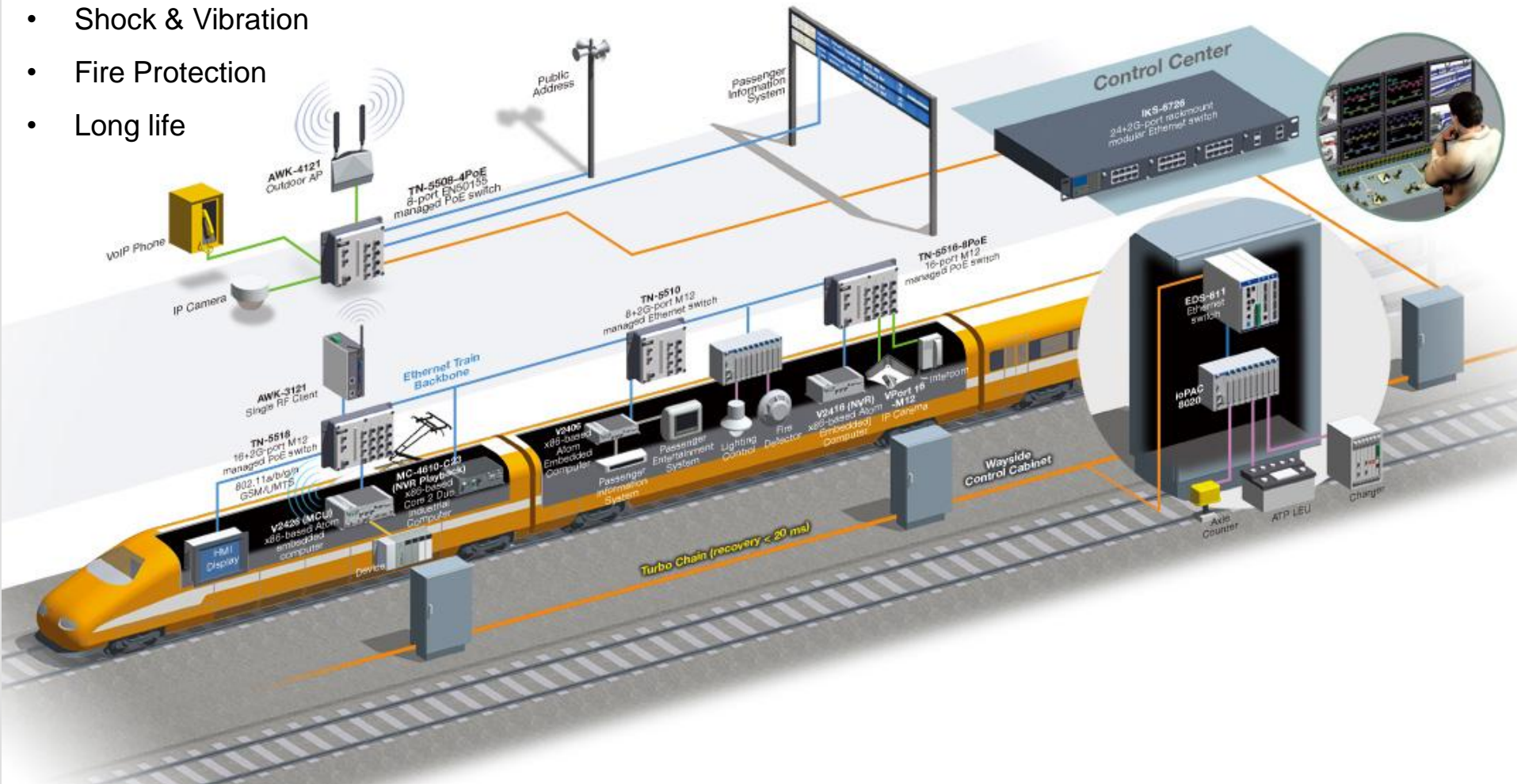
# Fields of Applications

- **Railway**
- **Highway Tunnels**
- **Public Transport Buses**
- **Power – Wind Park**

# Railway

## Key challenges:

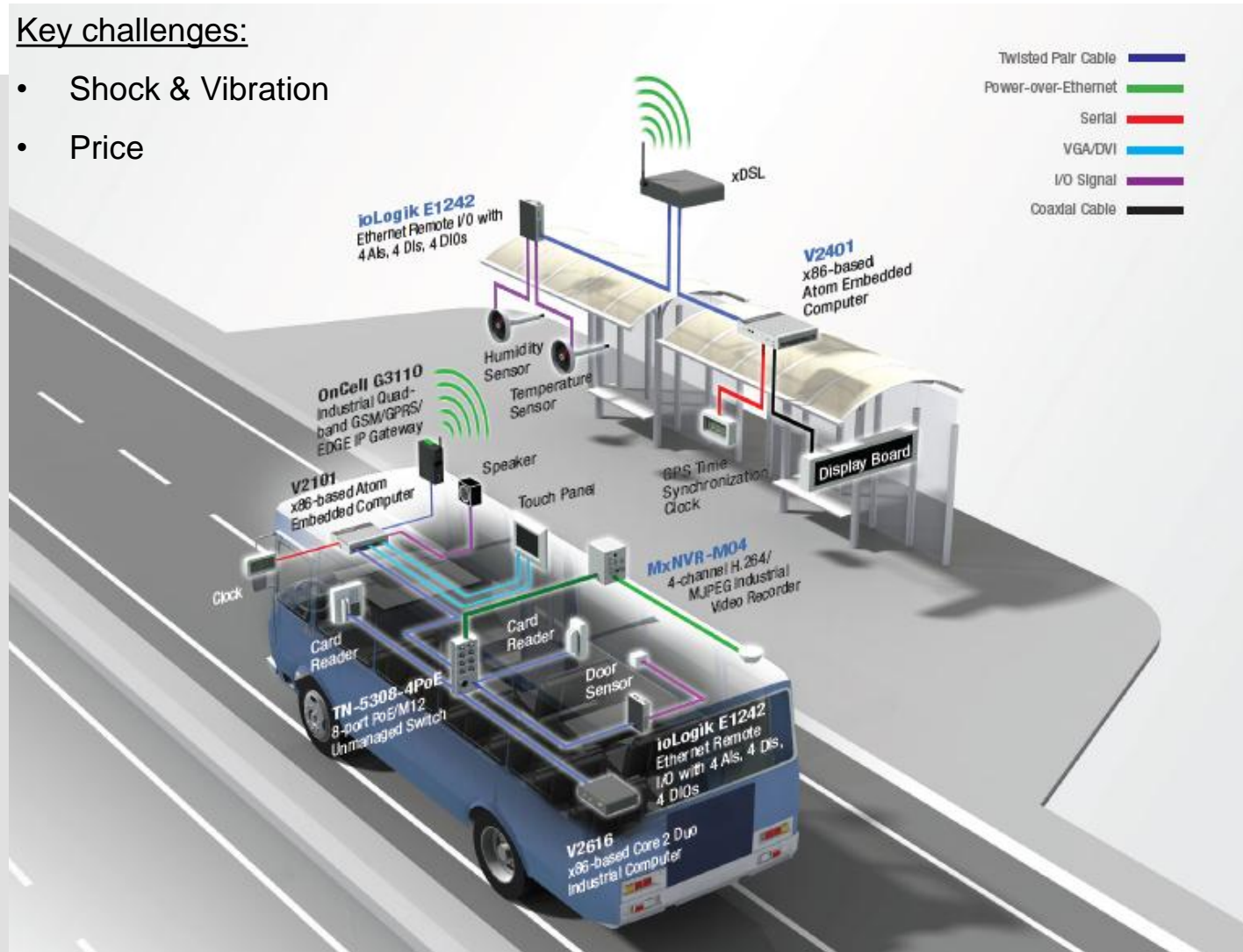
- Shock & Vibration
- Fire Protection
- Long life



# Public Transport - Buses

## Key challenges:

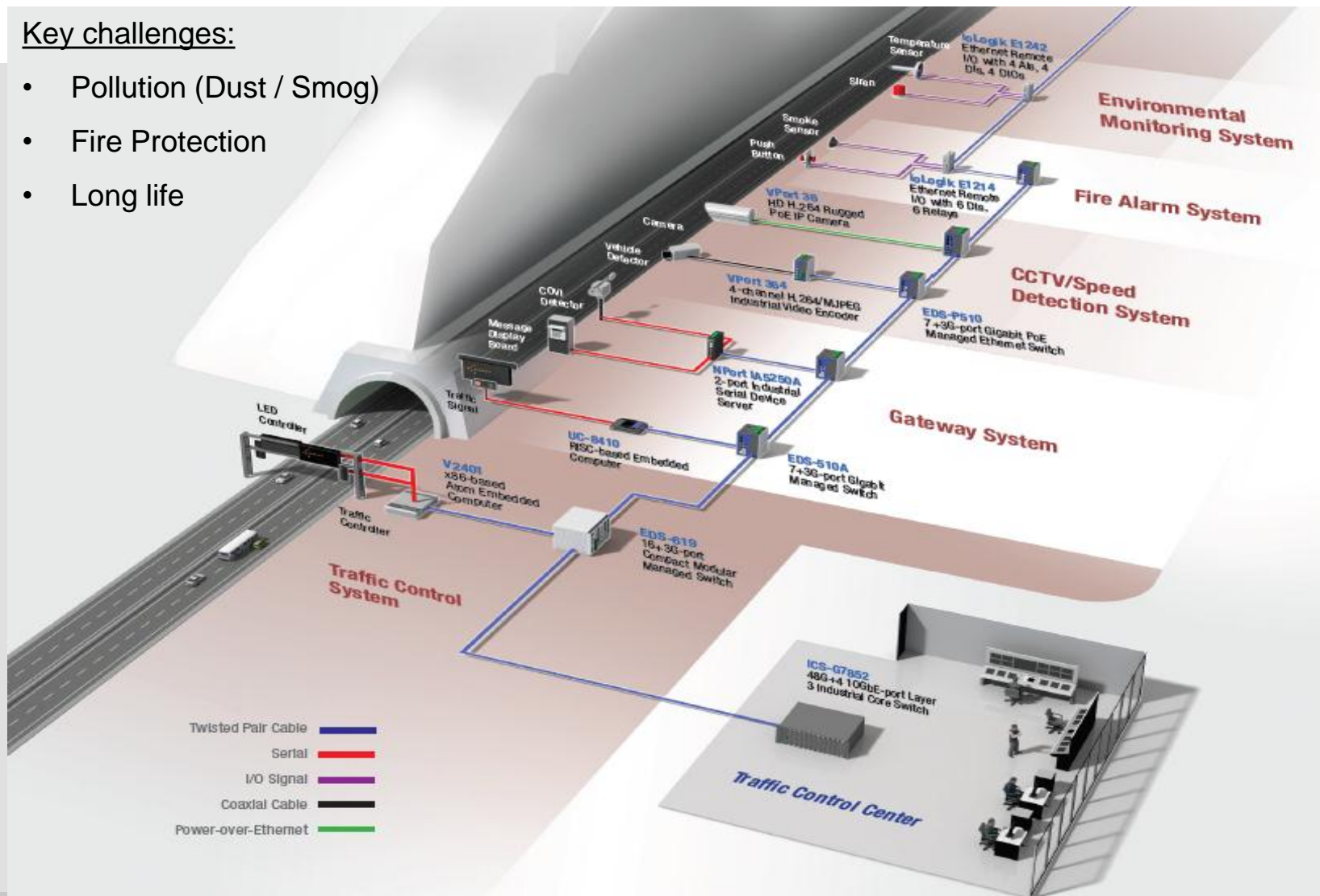
- Shock & Vibration
- Price



# Highway Tunnels

## Key challenges:

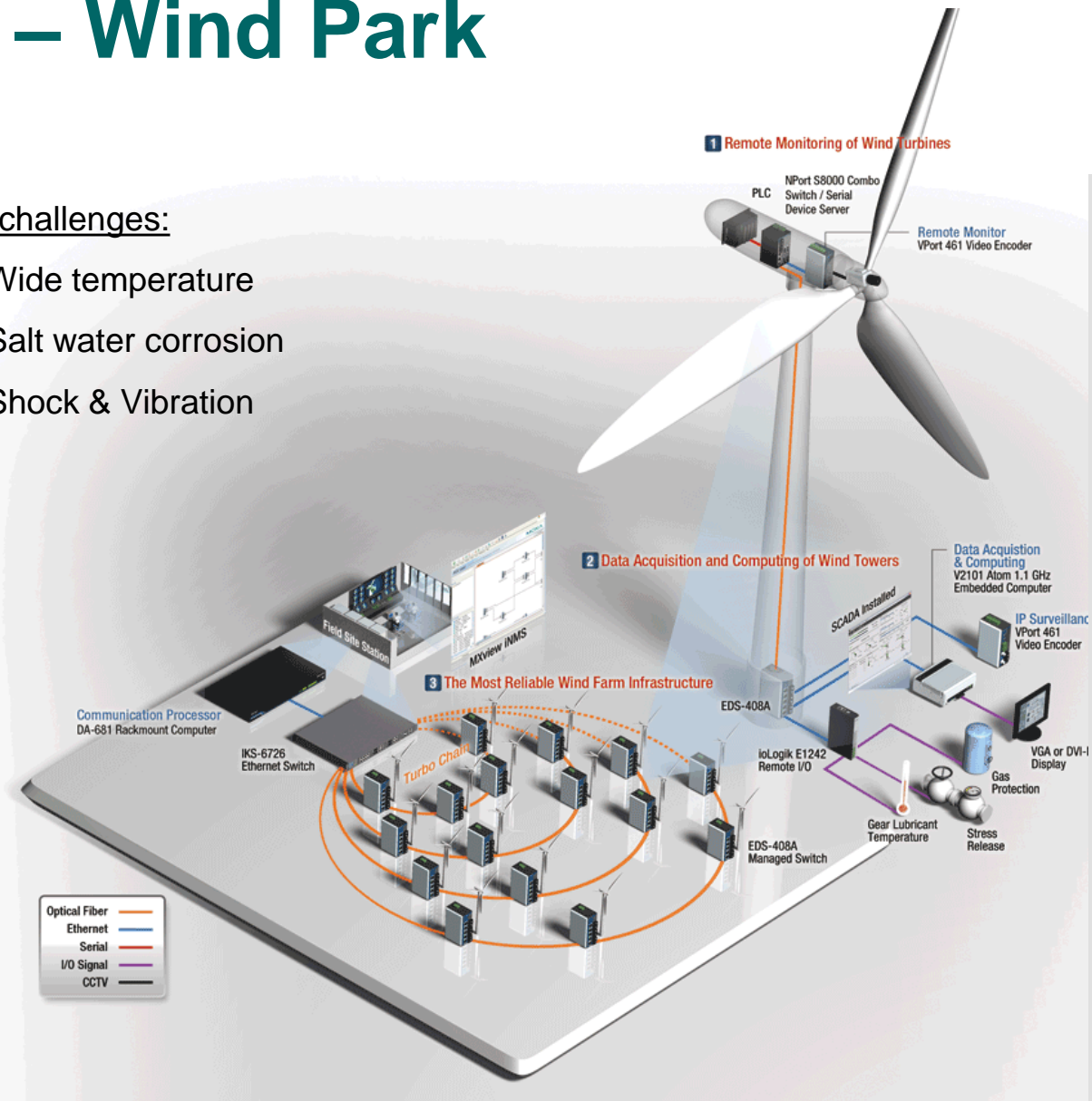
- Pollution (Dust / Smog)
- Fire Protection
- Long life



# Power – Wind Park

## Key challenges:

- Wide temperature
- Salt water corrosion
- Shock & Vibration



# Thank you



## **Moxa Americas Inc.**

MOXA Corporate Plaza,  
601 Valencia Avenue, #100,  
Brea, CA 92823

United States of America

**Tel:** 1-888-MOXA-USA  
+1-714-528-6777  
**Fax:** +1-714-528-6778  
**Email:** [usa@moxa.com](mailto:usa@moxa.com)  
**Web:** [www.moxa.com](http://www.moxa.com)

## **Moxa China Co., Ltd. (Shanghai Office)**

18F, No.1160, Yan An West Road Metro  
Bank Plaza, Shanghai

China, 200052

**Tel:** + 886-2-8919-1230  
**Fax:** + 886-2-8919-1231  
**Email:** [asia@moxa.com](mailto:asia@moxa.com)  
**Web:** [www.moxa.com.tw](http://www.moxa.com.tw)

Further Offices: Beijing & Shenzhen

## **Moxa Europe GmbH**

Einsteinstrasse 7  
85716 Unterschleissheim

Germany

**Tel:** +49-89-3 70 03 99-0  
**Fax:** +49-89-3 70 03 99-99  
**Email:** [europe@moxa.com](mailto:europe@moxa.com)  
**Web:** [www.moxa.com/de](http://www.moxa.com/de)

## **Moxa Inc. (HQs)**

4F, No. 135, Lane 235, Pao-Chiao Rd.  
Shing-Tien City,

Taipei, Taiwan

**Tel:** + 886-2-8919-1230  
**Fax:** + 886-2-8919-1231  
**Email:** [asia@moxa.com](mailto:asia@moxa.com)  
**Web:** [www.moxa.com.tw](http://www.moxa.com.tw)