



## **Telemetry, SCADA and Telecontrol using TETRA-Infrastructure**

**IWCE Presentation**



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## Why TETRA and not ....

APCO 25

DMR

WiMAX

WiFi

GSM, Edge, 2G, 3G, 4G, LTE

Other digital Wireless Systems

**... because ?**

**Try to compare all technical and commercial aspects  
of the following presentation with the mentioned  
technologies**

## Before we start one Question: What is SCADA?



## SCADA (Supervise Control and Data Acquisition)

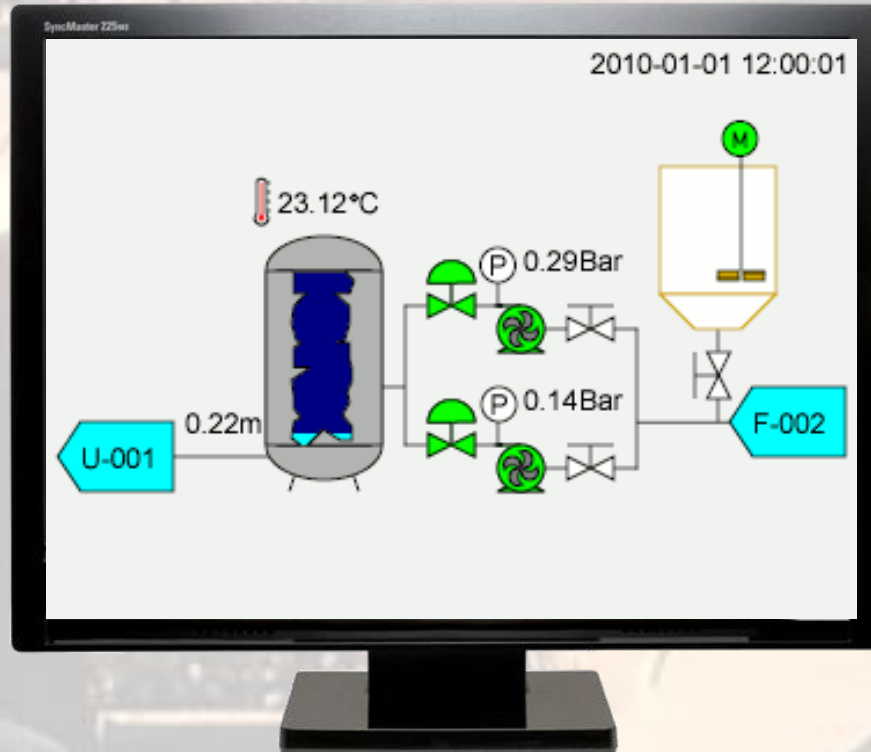
The term “SCADA” basically includes the whole system starting from the Monitors and Computers in the Control Room, the Interfacing to the Infrastructure, the Infrastructure itself, up to the Outstations the PLC's and Sensors or Actors.

The following Slides will demonstrate how the SCADA Control Room Part can be interfaced to Tetra Infrastructure using different options and how the data communication speed can be optimized.

Ref.:

[http://de.wikipedia.org/wiki/Supervisory\\_Control\\_and\\_Data\\_Acquisition](http://de.wikipedia.org/wiki/Supervisory_Control_and_Data_Acquisition)

# Typical SCADA Server Layout



Ref:  
Scada: Wikipedia  
Monitor: Samsung

**A few pictures from different sites using wireless  
SCADA will demonstrate some typical  
applications**



## Utility (Energy Companies)



## Remark from a potential TETRA user (Utility) in the U.S.

TETRA seems best suited for high priority, low to moderate bandwidth data communications within the full coverage footprint of an utility's two-way radio system. This can be of particular value to rural communications where public services are spotty or very limited to non-existent. Communications seems best suited for **distribution automation** connections to various **smart grid devices** like **remote switches, capacitor banks, voltage regulators**, etc. where **high reliability** is important but very low latency or high bandwidth is not required. Other types of communications may be possible with TETRA including **small substations** and **mobile data communications** but these may be limited or hampered by the characteristics on latency or bandwidth for data throughput speeds.

# GAS Flow Control with Solar Power (Germany)



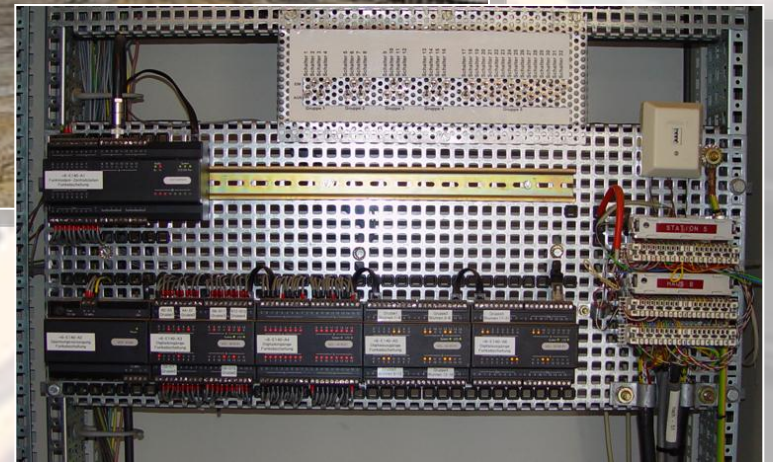
# GAS Quality Control



# Waste Water Monitoring Treatment Plant



# Surface Coal Mining (Water Level Control)



# What can TETRA provide for Supervise Control and Data Acquisition?

**Keywords are:**

**Status Message  
SDS Messaging  
Secondary Control Channel  
Packet Switched Data  
Multi Slot Packet Data**

## **STATUS Message:**

- **A Status message is the shortest and fastest way to send or receive command or status information over TETRA**
- **Status Message size is 16 Bit**
- **Can be sent/received from Control room (SCADA) or from any Outstation**

**STATUS Messages can be used for:**

- **Alarm Information from outstations**
- **Polling Request**
- **“Silence Command” from SCADA**

## SDS Message:

- An SDS message can be compared with an SMS text message in GSM networks but an SDS will be instantly delivered
- SDS single message size is up to 255 byte
- Multi SDS can be used for larger data

### SDS Messages can be used for:

- Text communication
- Data Communication (Protocols, Alarms, . . . )

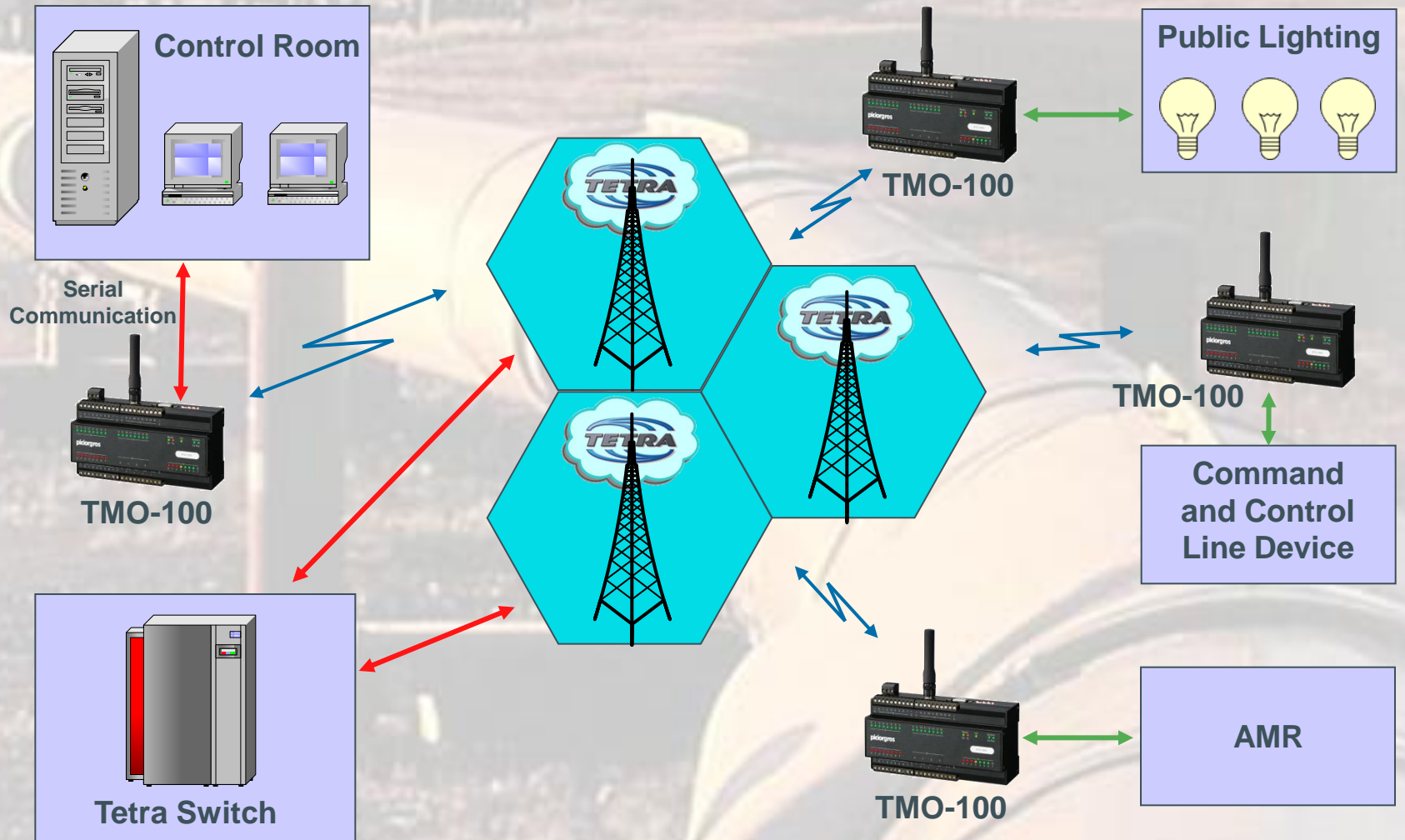
## Secondary Control Channel:

- SDS Messages are sent on the MCCH (Main Control Channel) on the first time slot
- Additional control channels (SCCH) can be configured for each of the remaining three time slots
- On one carrier a maximum of four control channels is possible

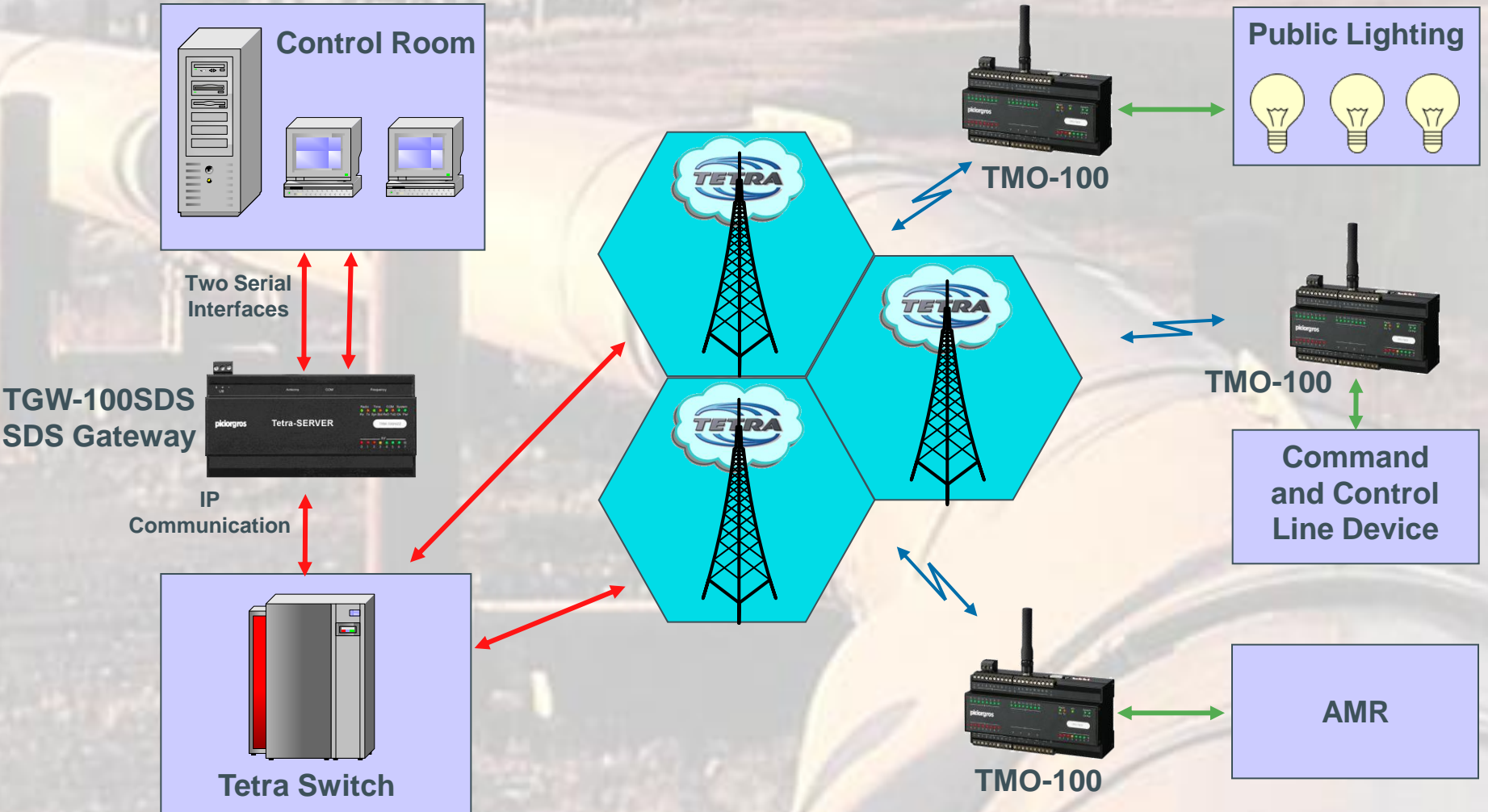
SCCH can be used for:

- Separate data from MCCH or Voice Traffic
- Reduce MCCH load
- Split applications

# SCADA using SDS based Radio-to-Radio Communication



# SCADA – using an SDS Gateway



## Packed Switched Data:

- With Packet Data, IP communication is possible on TETRA networks
- Packed Data needs Traffic Channels for communication, similar as voice
- TETRA provides channel sharing between devices

Packet Data can be used for:

- UDP communication
- TCP communication
- any low speed application (Data)

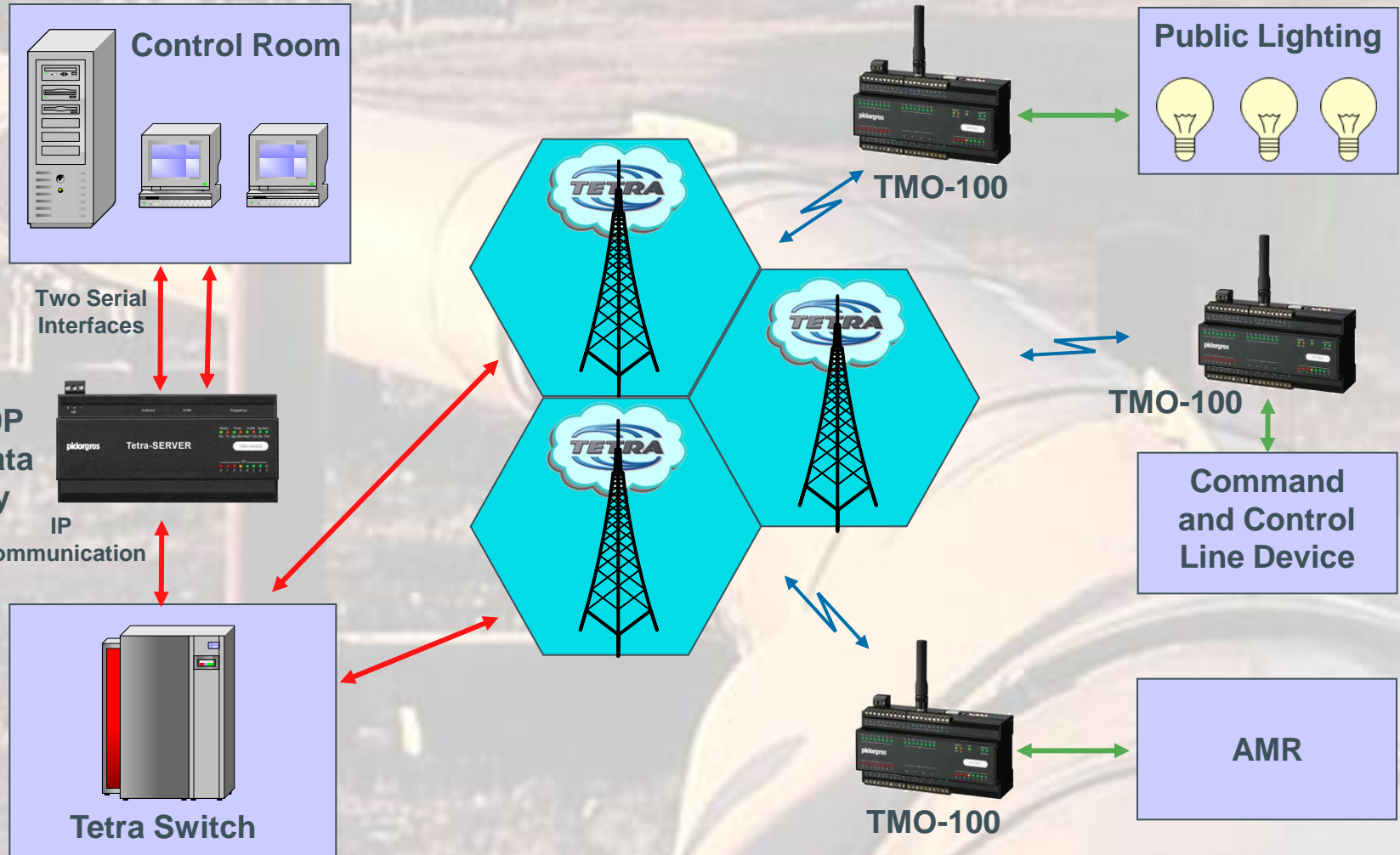
## Multi Slot Packed Switched Data:

- Multi Slot Packet Data uses two up to three traffic channels on the first carrier
- Multi Slot Packet Data can use up to four traffic channels on the second carrier

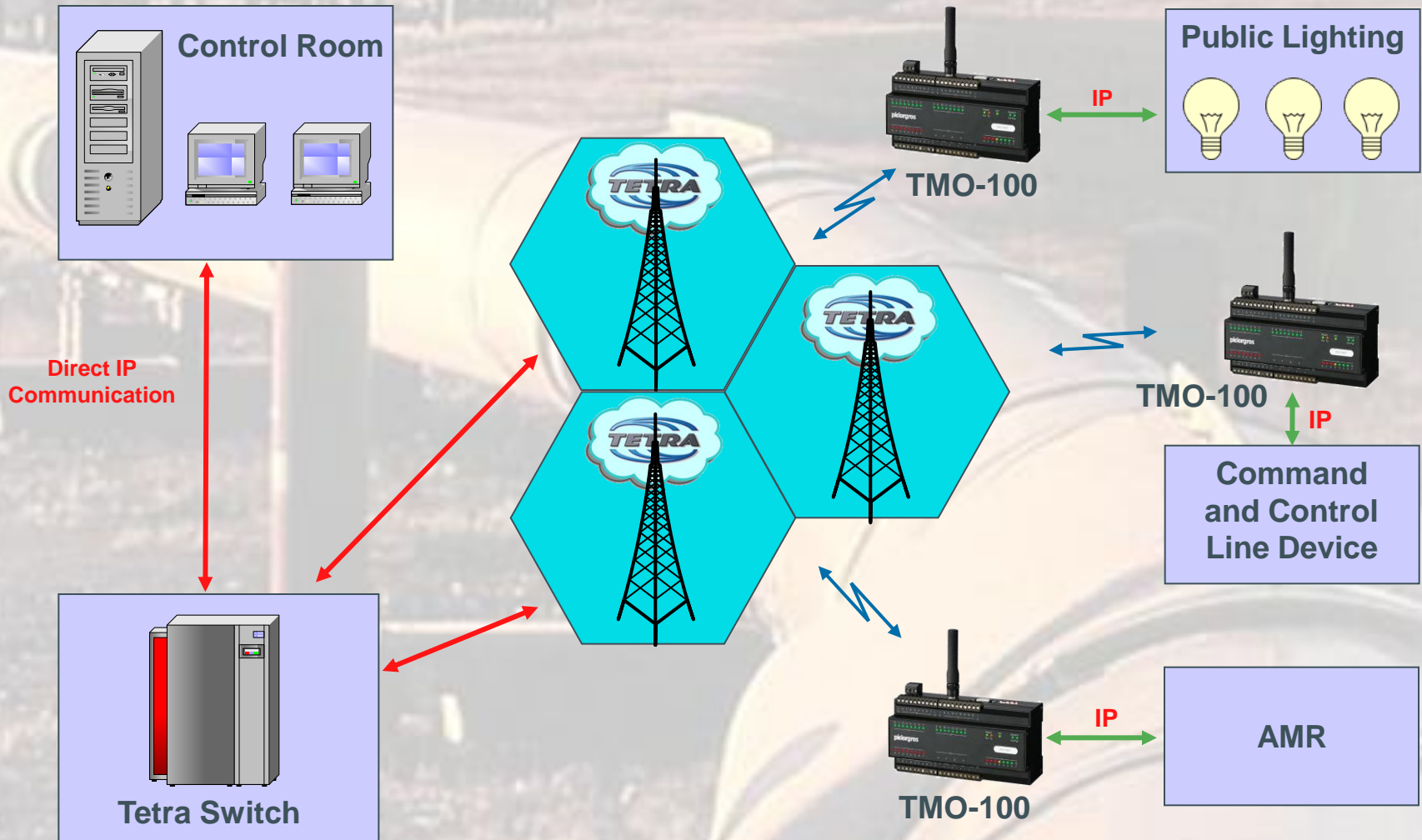
MSPD can be used for:

- UDP communication
- TCP communication
- any low speed application (Data)

# SCADA – using an Packet Data Gateway



# SCADA – using direct IP Communication



# Sending text from a computer to a TETRA terminal



# Sending a text message from a terminal to a computer



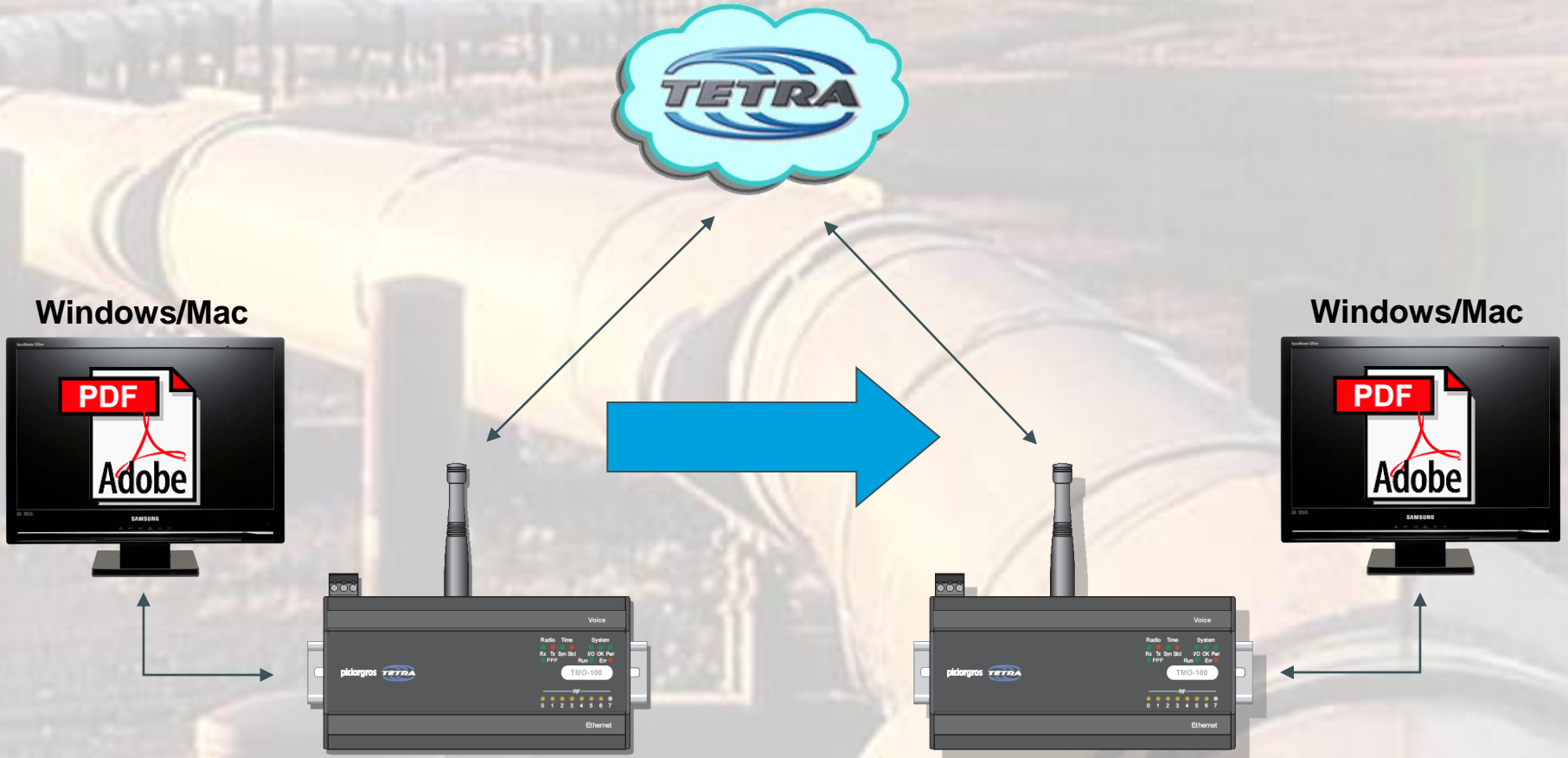
# Monitoring the RF-Field Strength using a Status Command



# MMI Commands from Terminal to Outstation (MMI = Man Machine Interface)



# File transfer with SDS / PD





# SCADA (PC) to PLC/RTU communication using SDS (PD)



# Send an Alarm (Text) to a TETRA Terminal



Please don't forget:

All of that was:



Yes, we can!

So, can the others too??? Please  
compare by yourselves



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