

# Requirements for mission critical multi service networks in transit systems.

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## Who is OTN Systems?

- OTN Systems develops and supplies fiber optic communication networks for Metros, Light Rail, Railways and Maglev.
- More than 15 years of experience at 85 Transit Authorities world-wide: Amtrak, SEPTA, Sprinter, ...
- Member of APTA & UITP

# Intro: What is important for you?

## Passengers

Safety

Security

Comfort

Price

New services

## Operators

Operational safety  
Cyber security

CCTV  
Access control  
.....

Public announcements  
Smart ticketing  
Clear Message Signs  
...

Low cost of ownership  
Open to sub suppliers  
Maximum flexibility

Future proof

## Network

High reliability  
Deterministic behavior  
Unhackable

Video solution  
Easy integration

Redundant network  
24/7 service  
Simple installation  
Open system

Limited training  
Zero maintenance  
No upgrading required  
No downtime  
Open system

Open interfaces  
Innovative solutions

**Multi**

**Simple**

**Non Stop**



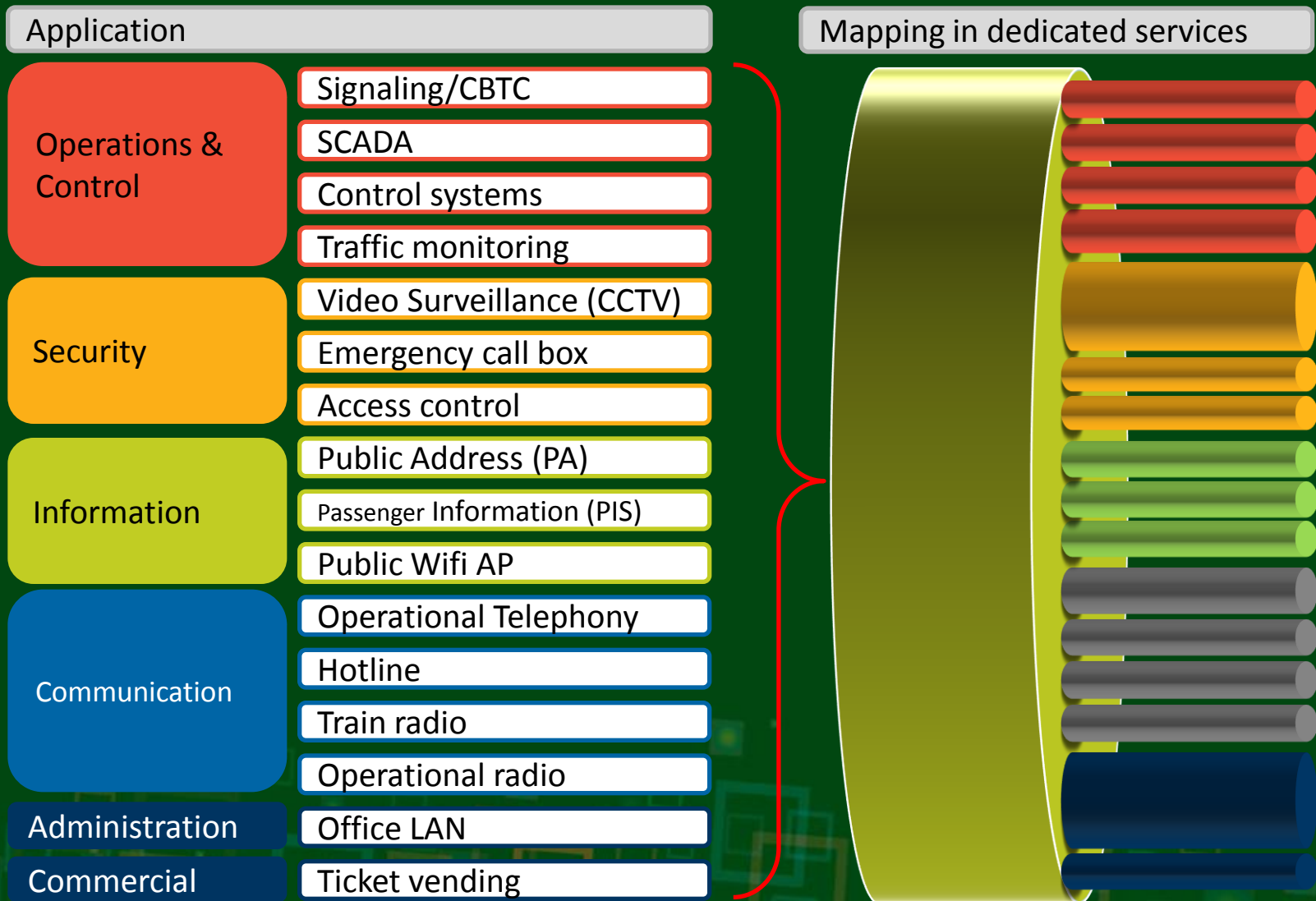
**Cost Effective**

# Multi: Connect all applications

- Many different applications
- Integration must be easy
- Applications may not interfere
- Network has to provide enough capacity
- Network has to be future proof but also support legacy interfaces



# Multi: Mapping of applications into services on the network



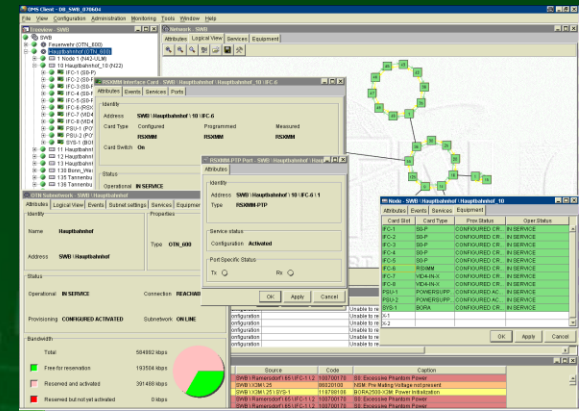
# Keep it Simple!

## Why?

- Easy network design & planning
- Project risk reduction
- Limited training costs & knowledge obsolescence
- Reduction of human error
- Speed-up trouble shooting

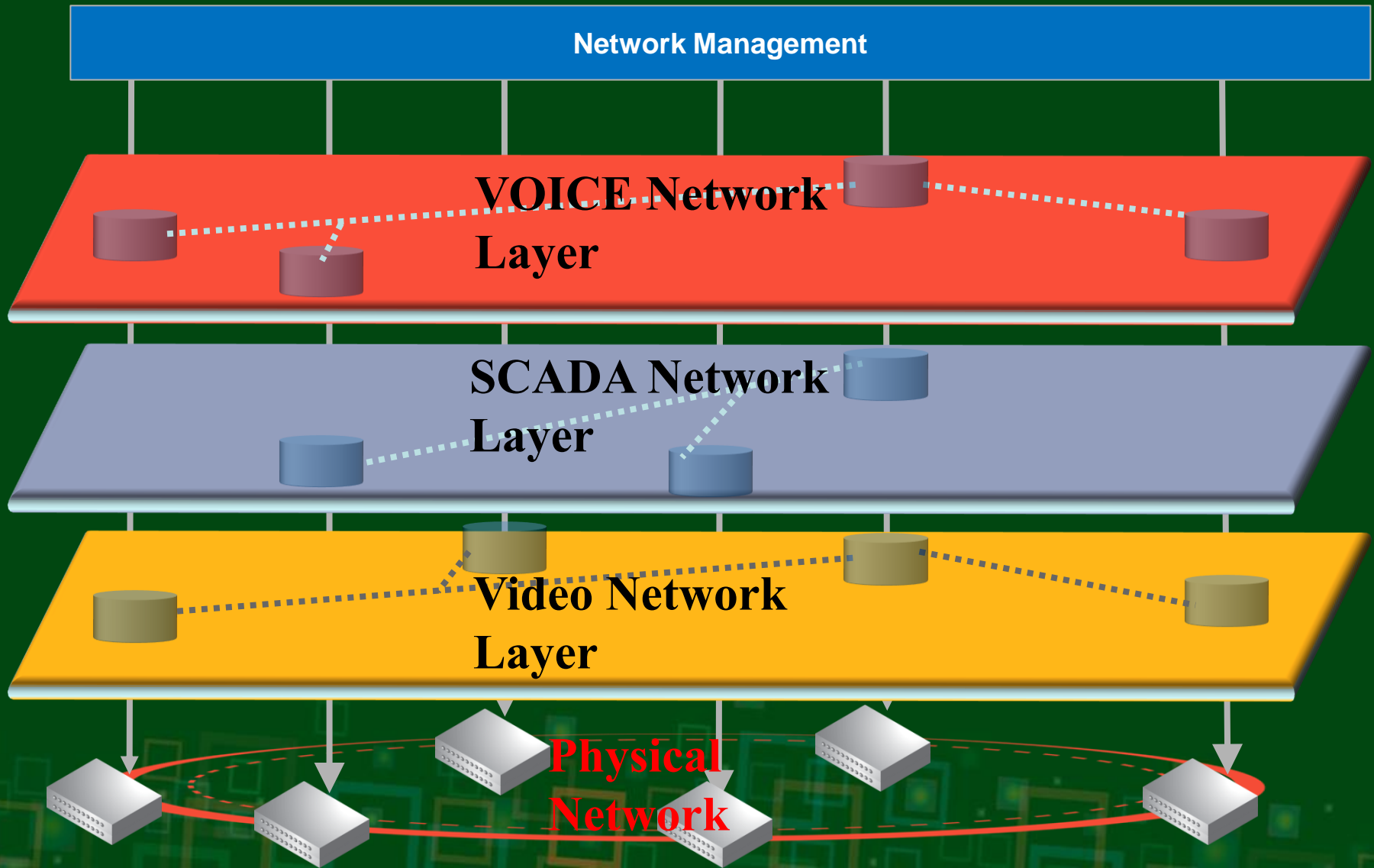
# Keep it Simple! How?

- Use hot-swap modular hardware
- Use a system-wide graphical network management system
- Separate the network into smaller, easy to manage application sub-networks



# Keep it Simple!

## Split into application sub networks





# Non-stop

- Network downtime has to be avoided
- Network needs to have a long operational life (>15y)
- Network has to work reliably in harsh conditions (dust, EMC, temperature)
- Network needs to be future proof

# Non-stop How?

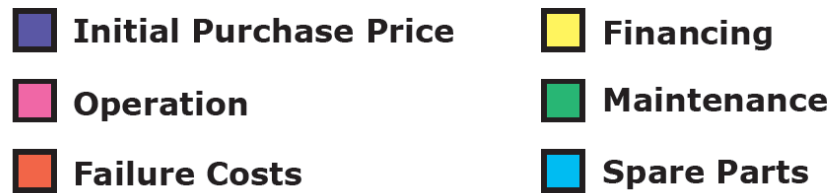
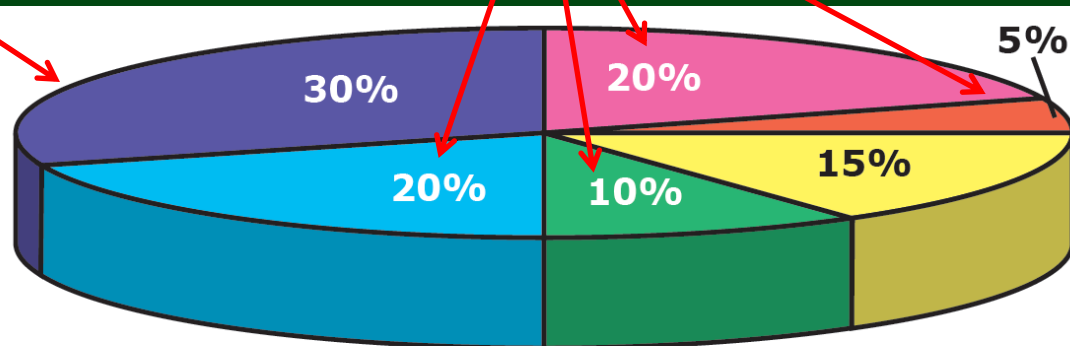
$$\text{Availability} = \frac{\text{MTBF}}{\text{MTBF} + \text{MTTR}}$$

- Network should be reliable (high MTBF) under harsh conditions  
=> provide hardware & network redundancy
- Network should be easy & fast to repair (low MTTR)  
=> simplicity, network mgmt tools & modular design

# Conclusion

Simplicity and reliability greatly reduce operations & maintenance costs!

Typical Initial equipment cost



*TCO Analysis Transportation Area*

(source: UITP Core Brief on Life Cycle Cost Optimization, September 2009)

**Thank you**

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