

Panel @ 10th International Conference on Networks (ICN 2011)

- Moderator:
  - Stein Gjessing, University of Oslo, Norway
- Panelists:
  - Börje Josefsson, SUNET, Sweden
  - Stein Gjessing, University of Oslo, Norway
  - Andreas Löffler, Friedrich-Alexander-University of Erlangen-Nürnberg, Germany
  - Gary Weckman, Ohio University - Athens, USA
  
- The ubiquitous Internet
  - A network that is everywhere
  
  - With acceptable network performance
    - Is the network performance good enough for me?
    - TCP vs. UDP
    - QoS ??
  
  - Overengineering
    - Wireless issues
    - Wired issues
    - Access vs. core network
    - Link capacity
    - Router capacity
    - Queuing
    - Etc., etc.



# Dealing with network performance

## Stein Gjessing, University of Oslo

- The ubiquitous Internet
  - A network that is everywhere
  - With acceptable **network performance**
    - **Is the network performance good enough for my use?**
- Currently I (with colleague Michael Welzl) struggle with the transport layer:
  - **All application currently use TCP** (or UDP)
- How can we (and why should we) improve the transport protocol?



# Transport protocols

- Issues (wanted choices we mostly don't have in TCP)
  - Connection oriented
  - Flow control
  - Congestion Control
  - Packet bundling
  - Error detection
  - Reliability
  - Delivery type (message or stream)
  - Delivery order (also in order to use multi-path)
  - Multiple streams
  - Multi homing
  
  - Acceptable performance over a combination of wired and wireless links



# The transport tussle

- “There is a vicious circle – application developers will not use a new protocol (even if it is technically superior) if it will not work end-to-end; OS vendors will not implement a new protocol if application developers do not express a need for it; NAT and firewall vendors will not add support if the protocol is not in common operating systems; the new protocol will not work end-to-end because of lack of support in NATs and firewalls.”  
M. Handley. Why the Internet only just works. BT Technology Journal, 24 (3):119–129, 2006.
- This is a catch-22 problem. The SIGCOMM 2002 paper “Tussle in Cyberspace: Defining Tomorrow’s Internet” [2] discusses this problem at length



# Not only TCP (and UDP)

- We need new alternatives at the transport layer
- But:  
Firewalls, middle-boxes, routers, .....  
only accept TCP-headers (and UDP-headers)
- How to deploy new and better transport layer protocols like:
  - Stream Control Transmission Protocol (SCTP)
    - Sequenced delivery within multiple streams
  - Datagram Congestion Control Protocol (DCCP)
    - Explicit Congestion Notification, feature negotiation

# One step . . .

- Invoke SCTP instead of TCP
- This will improve TCP with
  - Multiple streams over the same connection
    - E.g. when loading a web page
- Always beneficial ?
- Always enabled or negotiated ?
- Fall back to TCP if the other end doesn't support SCTP

# Performance panel

## ICN 2011

Börje Josefsson [BJ]

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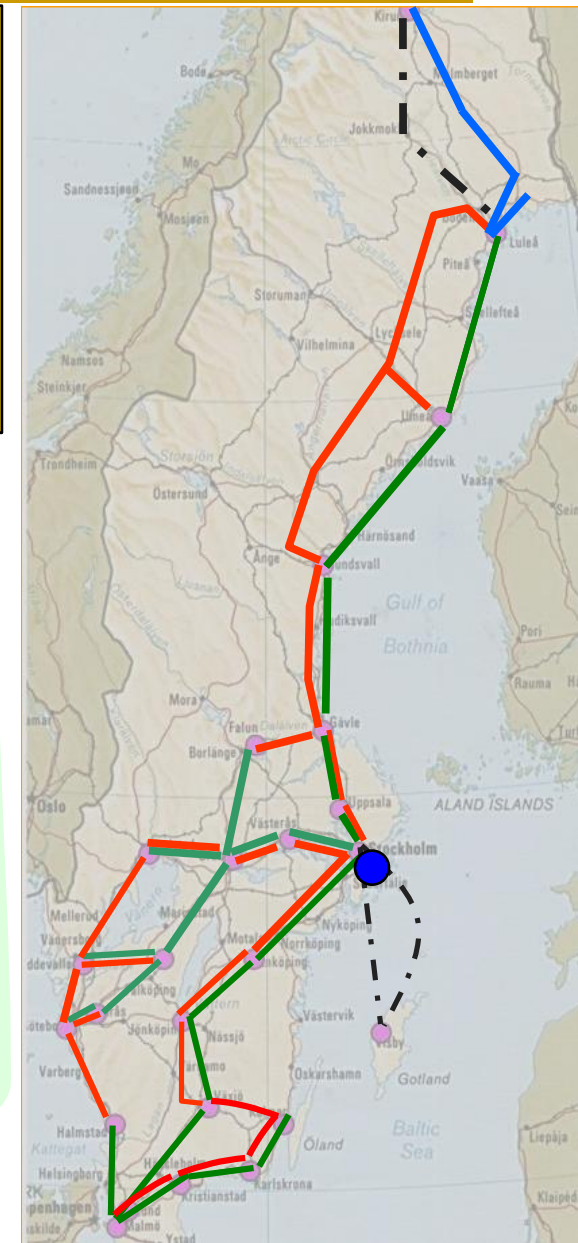
2011-01-24

# SUNET

the Swedish national research  
and education network



- Give universities access to both national and international connectivity of high class.
- Key factors are availability and capacity.
- Should not be a bottleneck in the Universities communication with the rest of the world.
- 2 \* 10 Gbit/s (exclusive), to all large universities.
- 2 \* 1 Gbit/s (exclusive), to the smaller universities and colleges.





# Some SUNET diary notes

- [1988] IP connectivity to all universities.
- [1988] First European NREN to get connection to the US research networks.
- [2001] First(?) 10 Gbit/sec nationwide core network.
- [2004] Internet Land Speed Record -- 4,3Gbit/sec over 29.000 km
- [2006] Network based on dark fiber and DWDM.
- [2007] First European long haul 40G  
("World's fastest mom") →
- [2008] World's longest 40G (Luleå-New York).



... be prepared...



# What is *performance*?

```
Reply from 193.11.X.X: bytes=32 time=199ms TTL=236
Reply from 193.11.X.X: bytes=32 time=334ms TTL=236
Request timed out.
Request timed out.
Request timed out.
Reply from 193.11.X.X: bytes=32 time=229ms TTL=236
Request timed out.
Reply from 193.11.X.X: bytes=32 time=197ms TTL=236
Reply from 193.11.X.X: bytes=32 time=1616ms TTL=236
Request timed out.
Request timed out.
Request timed out.
Reply from 193.11.X.X: bytes=32 time=341ms TTL=236
Request timed out.
Reply from 193.11.X.X: bytes=32 time=388ms TTL=236
Reply from 193.11.X.X: bytes=32 time=294ms TTL=236
Request timed out.
Reply from 193.11.X.X: bytes=32 time=261ms TTL=236
```

Ping statistics for 193.11.X.X:

Packets: Sent = 560, Received = 380, Lost = 180 (32% loss),

Approximate round trip times in milli-seconds:

Minimum = 190ms, Maximum = 3632ms, Average = 320ms

Example from the conference network this morning.

**Performance ≠ speed!**

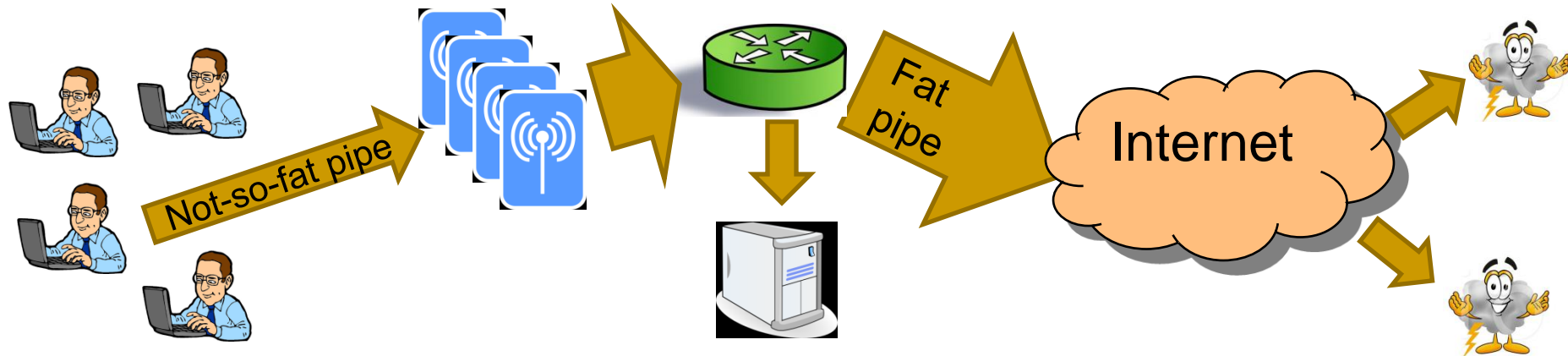
# Performance thoughts [1]

The network world is becoming upside down

We used to design the campus/enterprise networks like this:

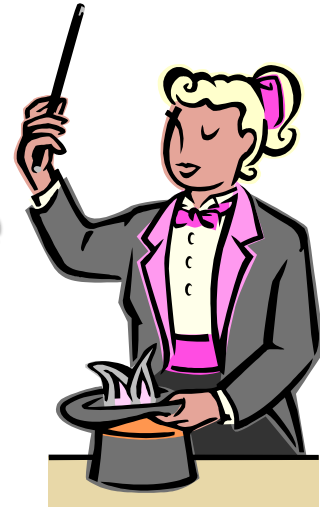


But now the user wants to be wireless, and “the cloud” is coming.



# Performance thoughts [2]

- Don't treat QoS as being the magic "*Create Bandwidth*" wand!
  - If you have bandwidth problems, QoS will **not** solve those, just move the problem somewhere else!
  - QoS still might make sense, on slow edge links – but not at the core level.
  - Inter-domain QoS is a nightmare and a mess, often creating more problems than it solves.
  - For the university world – who decides which researcher is more important than the other...
- In the long run, throwing more bandwidth on the problem often becomes easier and/or cheaper...





# The Tenth International Conference on Networks

## ICN 2011

Panel Discussion:

# Adoption of wide-band spread-spectrum modulated signals to localize UHF-RFID tags

Andreas Löffler

January 24, 2011 – St. Maarten, The Netherlands Antilles

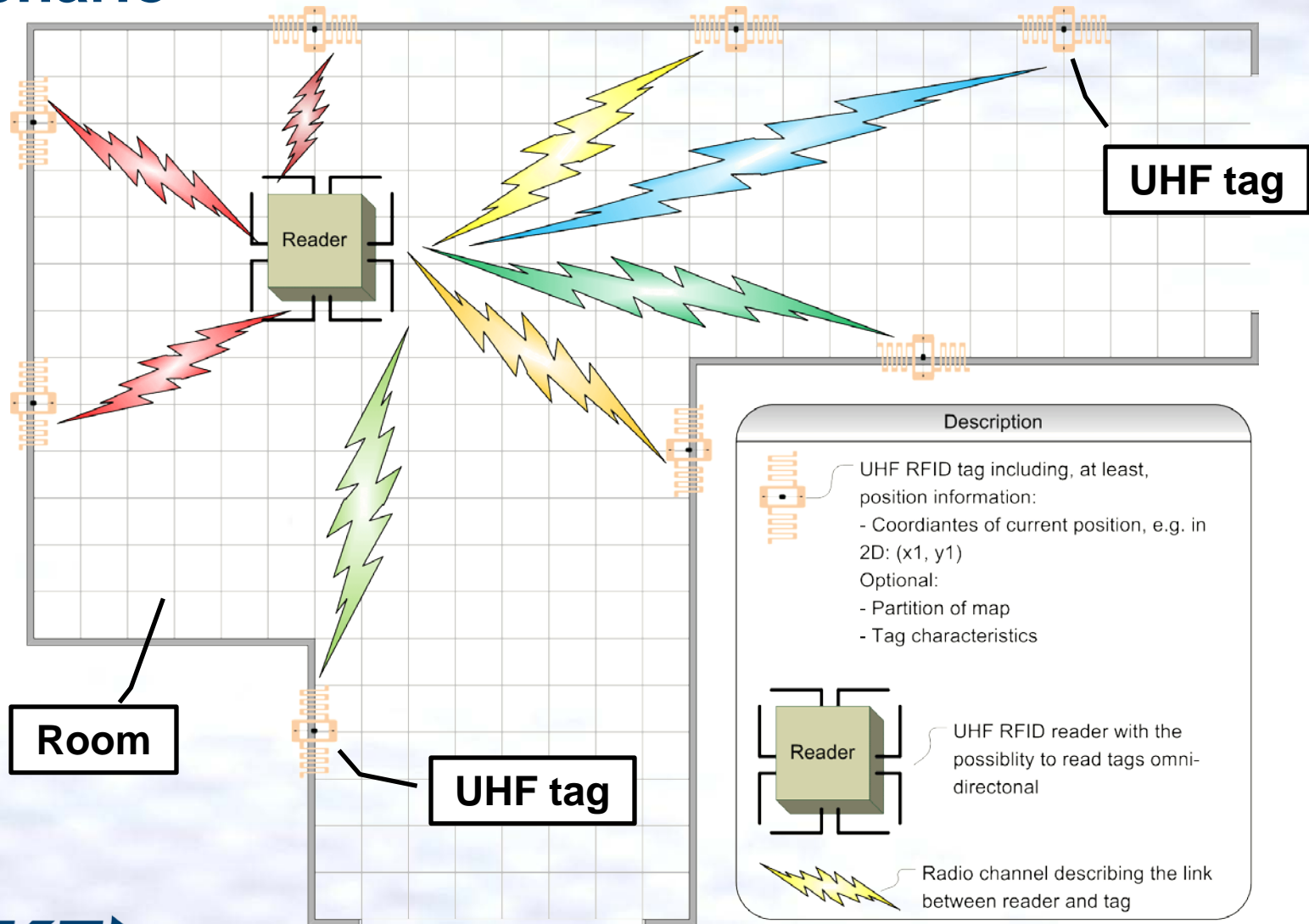


Chair of Information Technologies  
with Focus on Communication Electronics

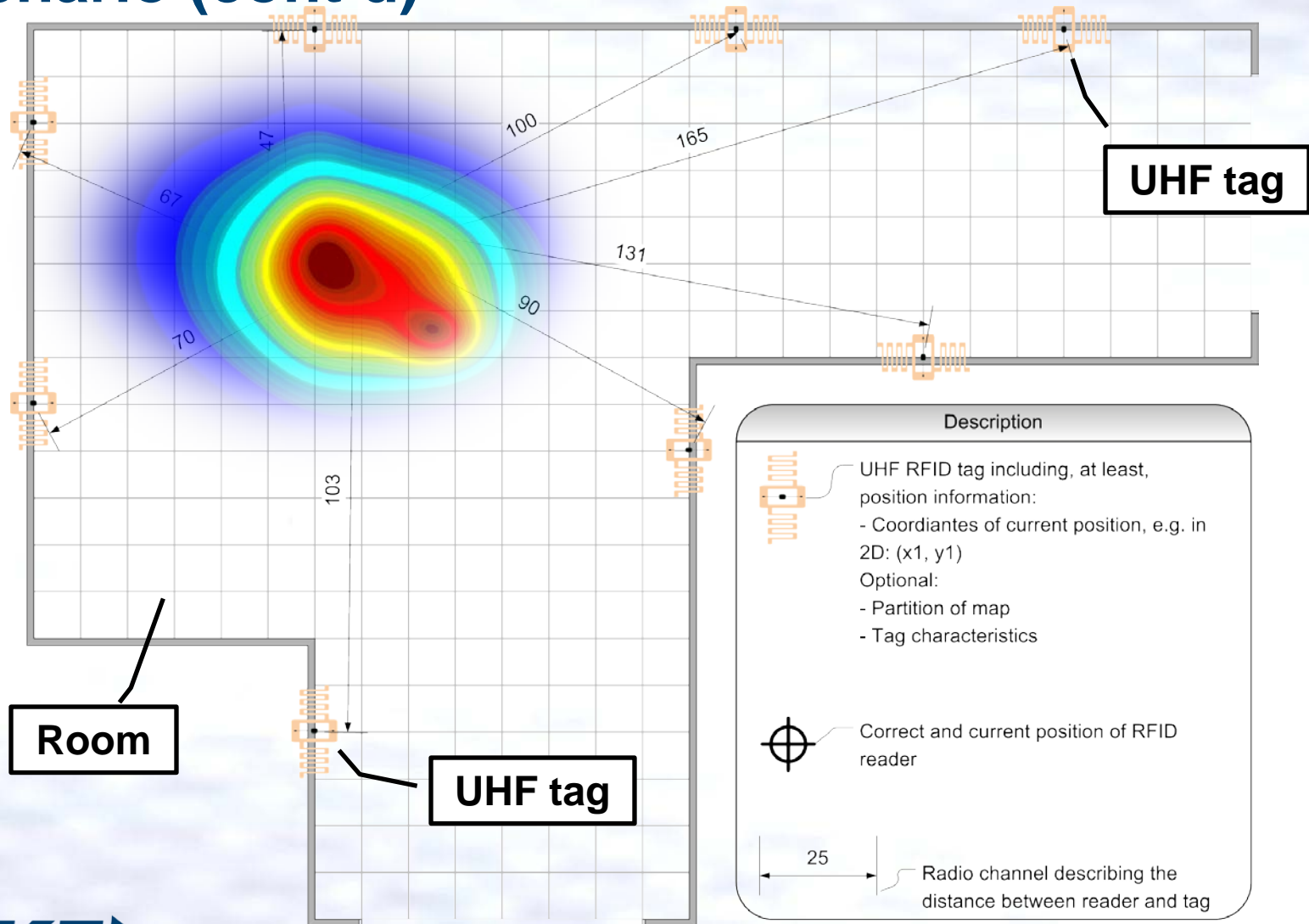
Friedrich-Alexander-Universität  
Erlangen-Nürnberg



# Scenario

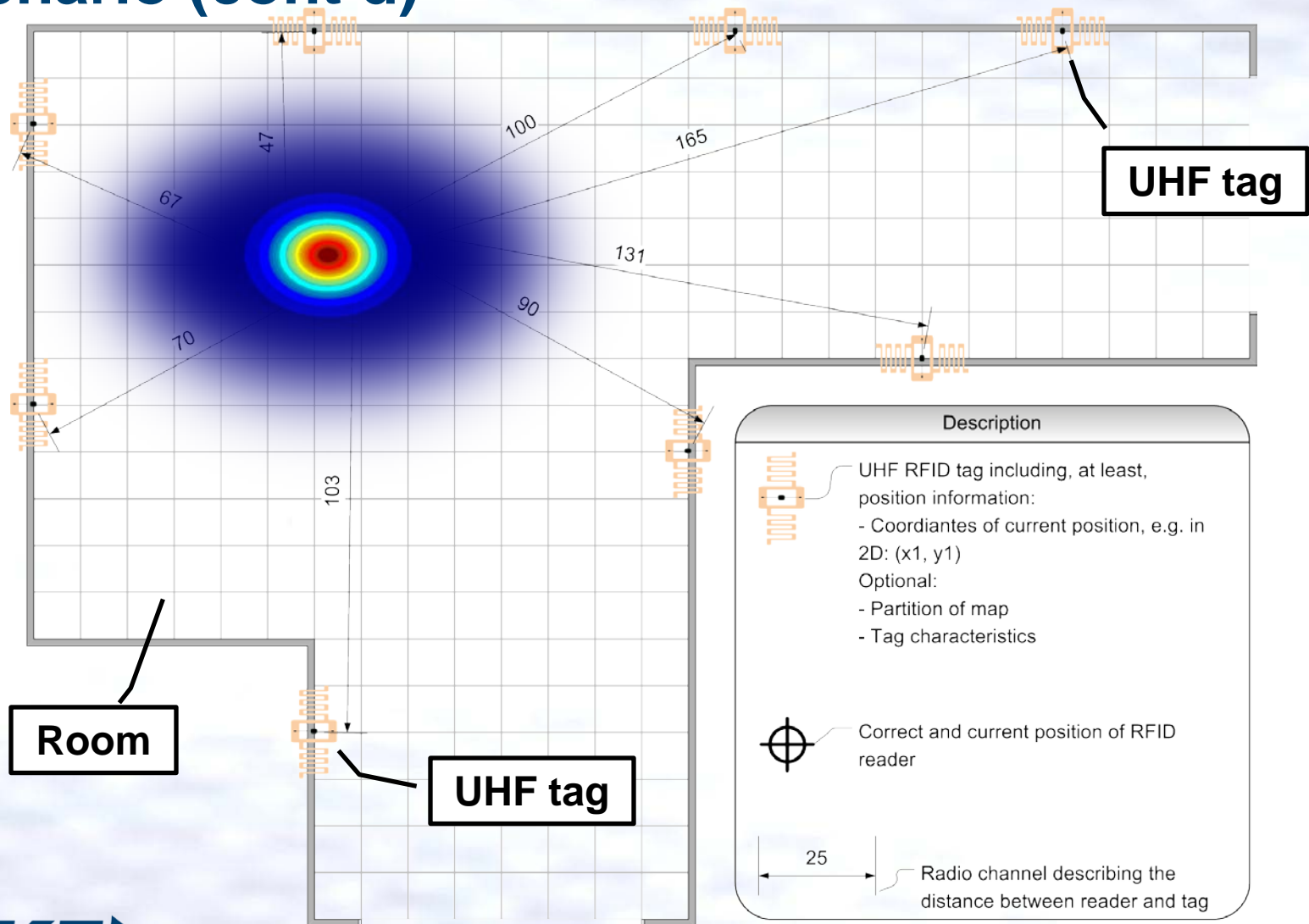


# Scenario (cont'd)





# Scenario (cont'd)

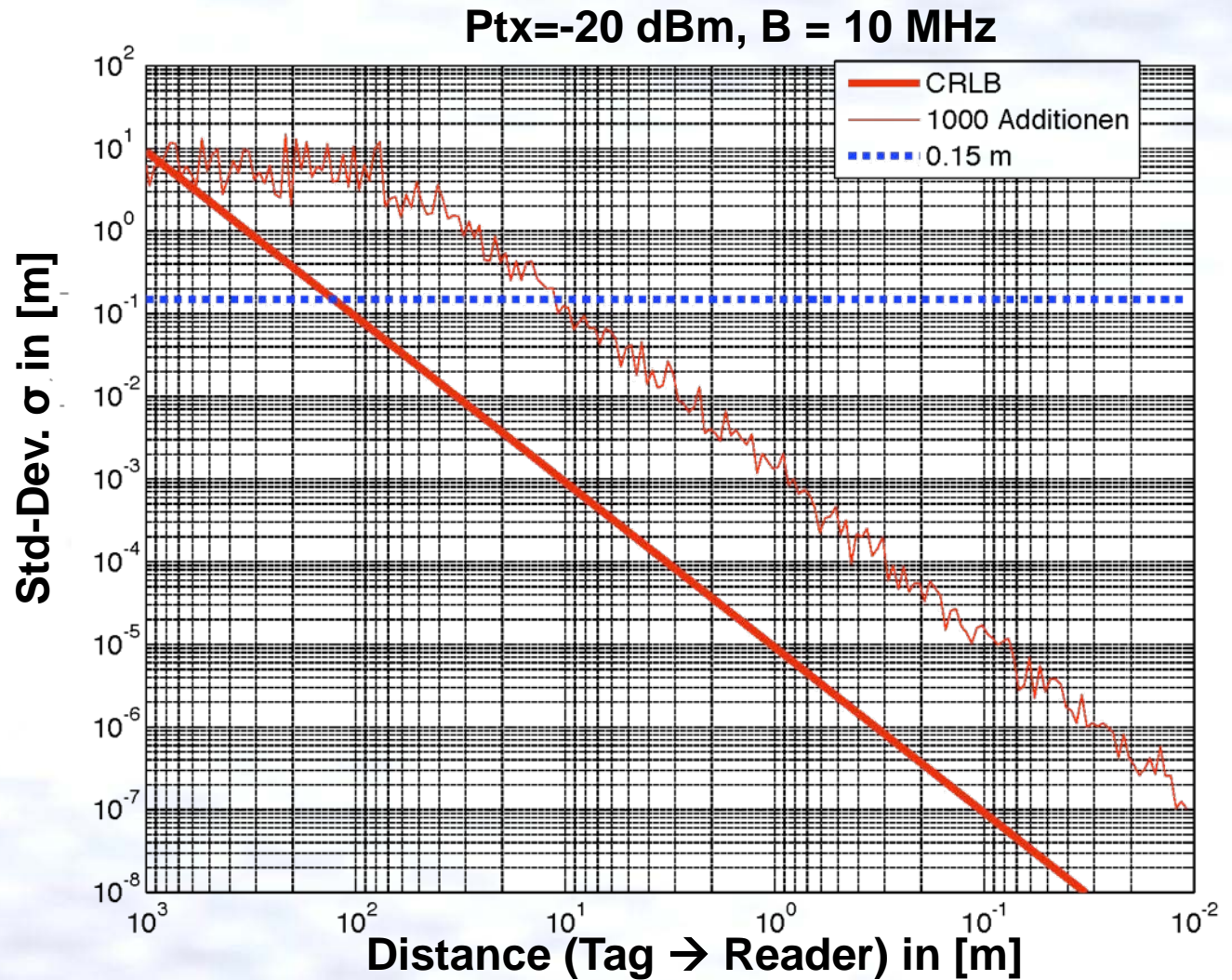


# State-of-the-Art

- ▶ RSSI-based → Fingerprinting, Reference tags
- ▶ AoA and DoA → more antennas
- ▶ Low accuracy because of Multi-path propagation and low bandwidth

→ **Why not use wideband signals (with lower power) ?**

# Results - Simulation





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## Panel Discussion!?

Andreas Löffler

January 24, 2011 – St. Maarten, The Netherlands Antilles



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# **The Tenth International Conf. on Networks (ICN 2011)**

*Network Performance Panel*

**“Network Service Industry and Outages”**

Gary Weckman, Ohio University  
weckmang@ohio.edu

# Status: Industry View of Outages

- “Industry” means service provider
- Impact and duration
  - Multiple services may be impacted by an outage
  - Multiple outages are often ongoing at one time
  - Each service may have separate outage profile
- What is “impact”?
  - Number of customers affected
  - Extent of impact on particular clients
  - Service provider revenue
  - Service provider reputation
- Service Provider Priorities:
  - Attend to restoring services and outages based on:
    - Impact to important clients
    - Impact on service provider revenue
    - Number of clients impacted

# Vision: Tools to Balance Investment and Operational Decisions

- Optimization problem
  - Balance proactive and reactive response to outages
  - Proactive requires invest in fault tolerance
  - Reactive requires quick response capabilities
  - Min {Impact, Duration}
  - Balance {Investment Income, Operational expense}
- Need reactive tools to effectively manage network
  - Physical plane
  - Service plane
  - Control plane
- Need proactive intelligent analysis of outage data to track reliability, maintainability, availability, and survivability trends
  - Improvement
  - Constancy
  - Deterioration