
# GNSS Networks – Challenges & Opportunities

## Innovative Solutions from Leica Geosystems



- when it has to be **right**

Leica Geosystems

# GNSS Networks – Challenges & Opportunities

## Introduction

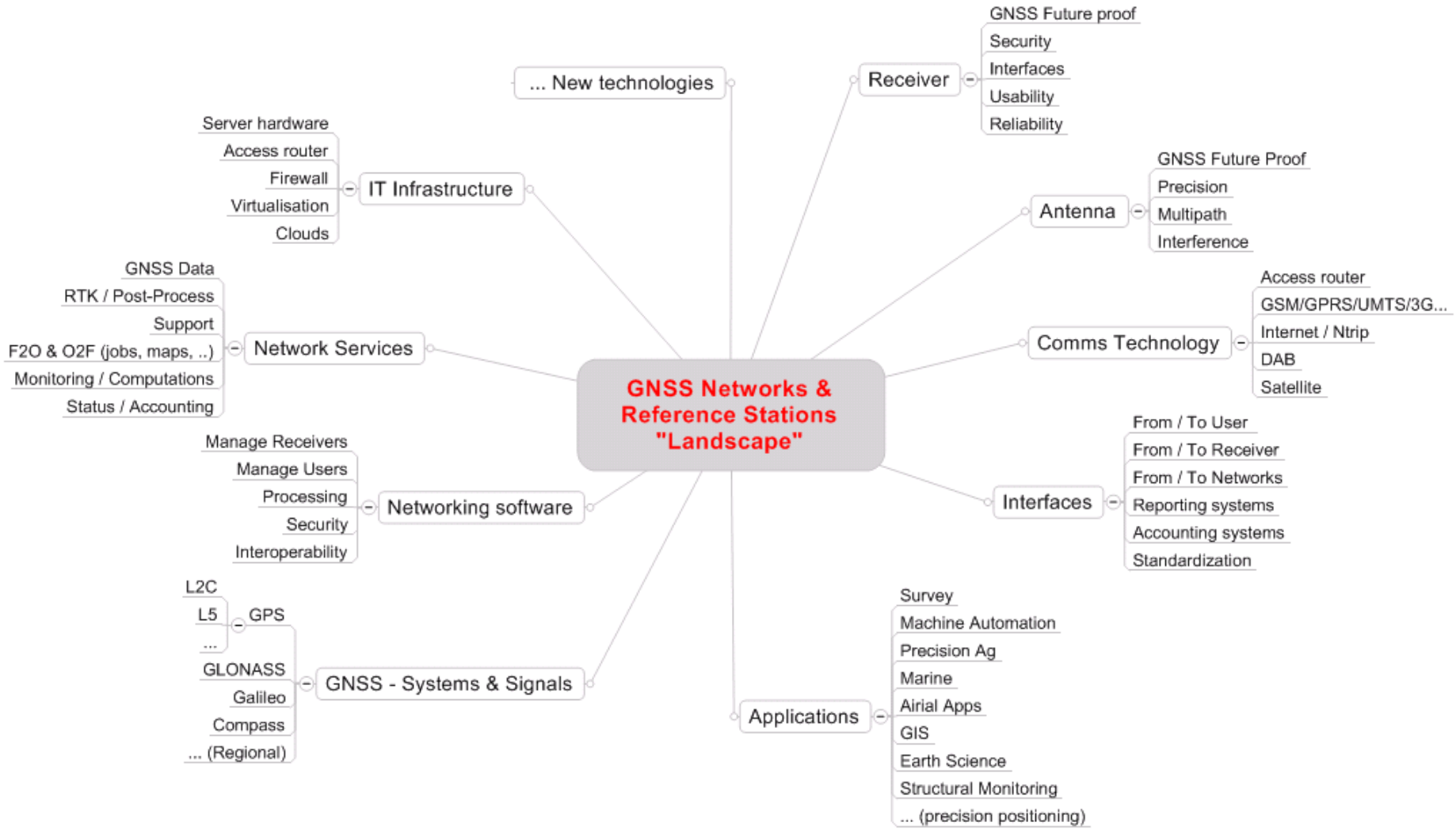
**GNSS and Network technology progressed significantly within the past 1 ½ decades, but also its applications.**

- From single sites Post-Processing to RTK
- From single site RTK to Network RTK
- From Local to Regional and Global RTK Networks
- From niche applications to common use for a majority of precise positioning uses
- From GPS to multiple GNSS
- From Data providers to Service providers

**Technology & application advances and a growing competitive environment creates both, challenges and opportunities**

# GNSS Networks – Challenges & Opportunities

## The “landscape” for GNSS Networks & Stations



# GNSS Networks – Challenges & Opportunities

## The “landscape” for GNSS Networks & Stations

# GNSS Networks – Challenges & Opportunities
## Market Trends

### General

- Importance of GNSS infrastructure is increasing
  - Moves to make GNSS part of National Critical Infrastructure
  - Increase in Centrally Managed Networks in both public and private ownership offering commercial RTK network services
- Support Modernized GNSS - Future Proof
- Extended range of applications
- Enhanced & Value-added services

# GNSS Networks – Challenges & Opportunities
## Receiver Technology & Operation

### GNSS Modernisation

- Receivers must be built for the new systems and signals
- All-in-view tracking of all available signals
- Genuine upgrade path for new signal and systems as they become available

### Security - Concerns over security and access protection

- GNSS hardware must be as secure as all other IT components
- Threat of attack increases as the value and public awareness of the infrastructure increases, e.g. d-o-s attacks
- Closer integration with existing IT & communication infrastructure required
- Firewall / Client Authentication / IP Filtering / HTTPS / SSL

# GNSS Networks – Challenges & Opportunities
## Receiver Technology & Operation

### Shared & Multi-Purpose Usage

- **Working in cooperative environments**

➔ **Multiple access for control, data, status**

- Shared use / data distribution
  → different levels of access (admin, editor, viewer etc.)

➔ **De-centralised file creation and dissemination**

- Different File Products Services
  - high rate: 1hr@1sec standard Network RTK /
    low rate: 24hr@30second IGS/EUREF
  - Multiple destination file servers (FTP sites)

# GNSS Networks – Challenges & Opportunities

## Receiver Technology & Operation

### Smarter technology

**- System administrators using the equipment and software, rather than people with survey background**

- Modern interfaces / wizards / tips / hints / comprehensive help
  ➔ “Intuitive” & “Assistive”
- System Monitor and diagnostics tools / Event logs / Alarms / Messaging
  ➔ “Informative”
- System Backup / Restore – easy roll back of changes
  ➔ “Forgiving”

# GNSS Networks – Challenges & Opportunities
## Network Services & Operation

### Trends:

- Keep up with integration into IT infrastructure developments
- Rapidly changing business environment
- Move towards serving multiple applications
- Serving a broader user base
- Differentiation from other service providers
- Development of unique business models
- Increasing competition
  ➔Pressure to reduce operational costs, increase profitability

# GNSS Networks – Challenges & Opportunities
## Network Services & Operation

### Comprehensive “all-in-one” Business Solution

- **RTK services**
  - Regardless of type, method or communication interface
- **Post – Processing services**
  - Raw data, Network corrected data
  - Computation services
- **Unique customer services, such as e.g.:**
  - Mobile-Com subscriptions
  - Rental / Support / Service ➔ “Rundum-Sorglos-Packet”
- **Suitable for any network size or even multiple networks**

# GNSS Networks – Challenges & Opportunities
## Network Services & Operation

### Comprehensive “all-in-one” Business Solution

- **Offering service packages with unique properties**
  ➔ Create unique business models
  - By using any combination of available services
  - Varying subscription periods
  - Regionally restricted service access

- **Capture precisely specific customer information**
  - Custom made user registration
  - Capture user data specific to the individual business model

# GNSS Networks – Challenges & Opportunities
## Network Services & Operation

### Comprehensive “all-in-one” Business Solution

- **Online accessible anytime from anywhere**
  **➔ Internet web portal**
  - For both, customer and administration
  - Different purpose administration access level (customer management, support, overall administration)
- **Online subscription to all offered services**
  - Subscription to individual services or service packages
  - Automatic notification on expiry
  - Renewal of subscriptions
- **Secure and integrative into existing IT infrastructure**

# GNSS Networks – Challenges & Opportunities

## Leica GR10: Plug & Play Reference Station

### GNSS Modernisation

- Multi-system, multi-frequency all in view tracking
- Future proof (upgradable measurement engine)


### Security

- HTTPs / SSL / Firewall
- Client Authentication / IP Filtering
- **System Roll Back**

### Seamless integration into existing IT infrastructure

- 19” IT rack mount and stackable for multi pre-configuration
- DHCP / DNS / DynDNS / Hostname / FTPS / SMTP
- **Built in Communication Slot with Device Management**

# GNSS Networks – Challenges & Opportunities

## Leica GR10: Plug & Play Reference Station

### Shared & Multi-Purpose Usage

- Multi-user and multi-level user access
- Multiple (up to 10) Logging sessions (32GB storage)
- Multiple (up to 20) parallel Data Streams (10 RTK)
- Multi-FTP server push

### Smarter technology

- Advanced Web GUI for easy setup and management incl. email notification service
- **Active Assist (for remote support behind firewall)**

# GNSS Networks – Challenges & Opportunities

## New Leica Spider Business Center

### - Professional Business Solution for GNSS Networks

- Online shop for tailored GNSS business offerings that allow to differentiate
- Transparent for provider and clients regarding current subscriptions and status
- Designed to manage and monitor services and usage
- Easy to integrate and maintain


➔ **Convenient, efficient and flexible services management**

# GNSS Networks – Challenges & Opportunities

## Quo Vadis …

**The landscape for GNSS Networks will change continually**

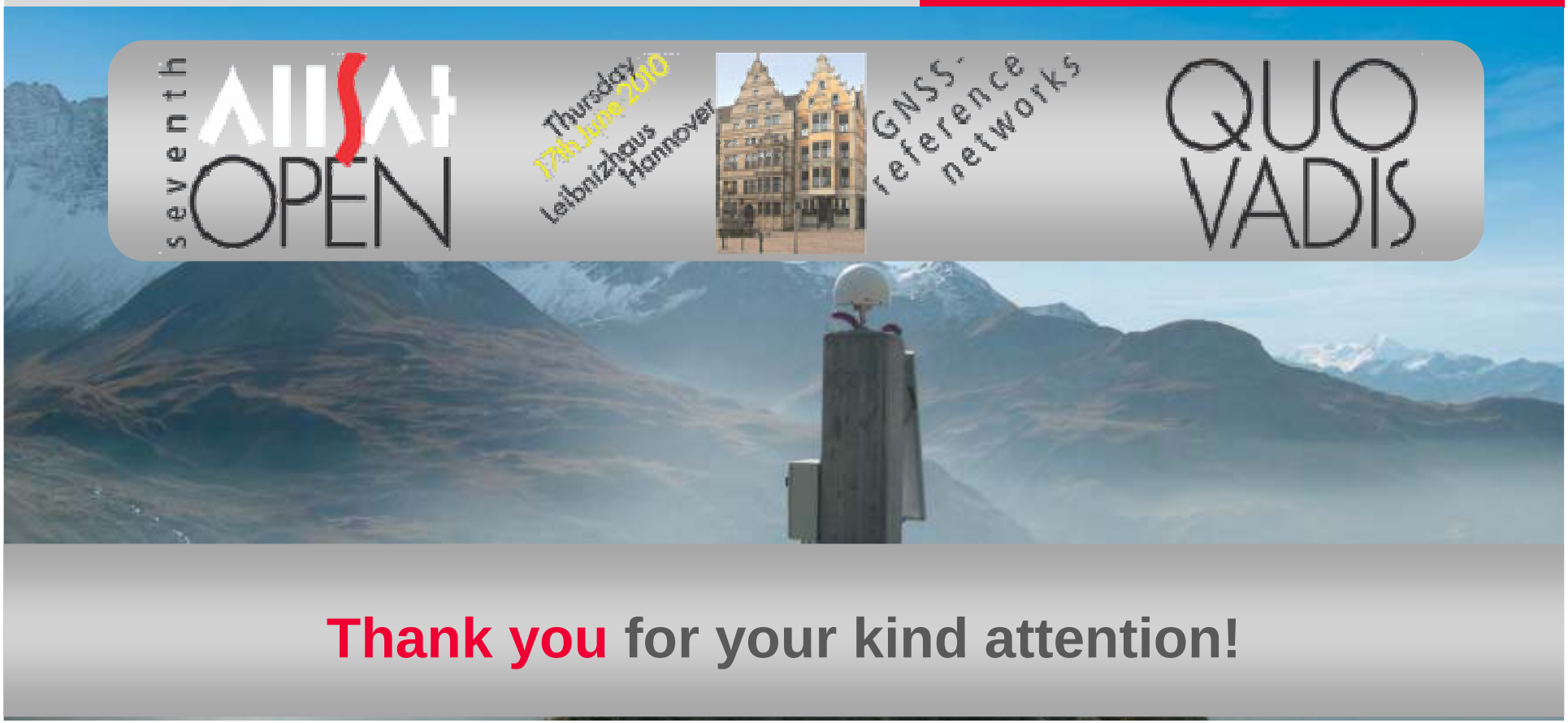
**Technology must support what is available today, yet must be capable to expand for future demands**

**Systems must be reliable and easy to maintain, customise and support, to enable profitable business**

**Solutions must be flexible to serve broader user base**

**Enable seamless integration of unique value added services**

**Increasing competition demands service providers to differentiate, yet need for compatibility and interoperability will grow**




# GNSS Networks and Reference Stations

## Innovative Solutions from Leica Geosystems

Leica Geosystems AG provides innovative solutions for single reference stations and GNSS networks using the latest satellite positioning technology, data processing algorithms and business solutions. Leica Geosystems' commitment is to provide a complete solution in terms of system proposal and consultancy, delivery, installation, training, support and maintenance.