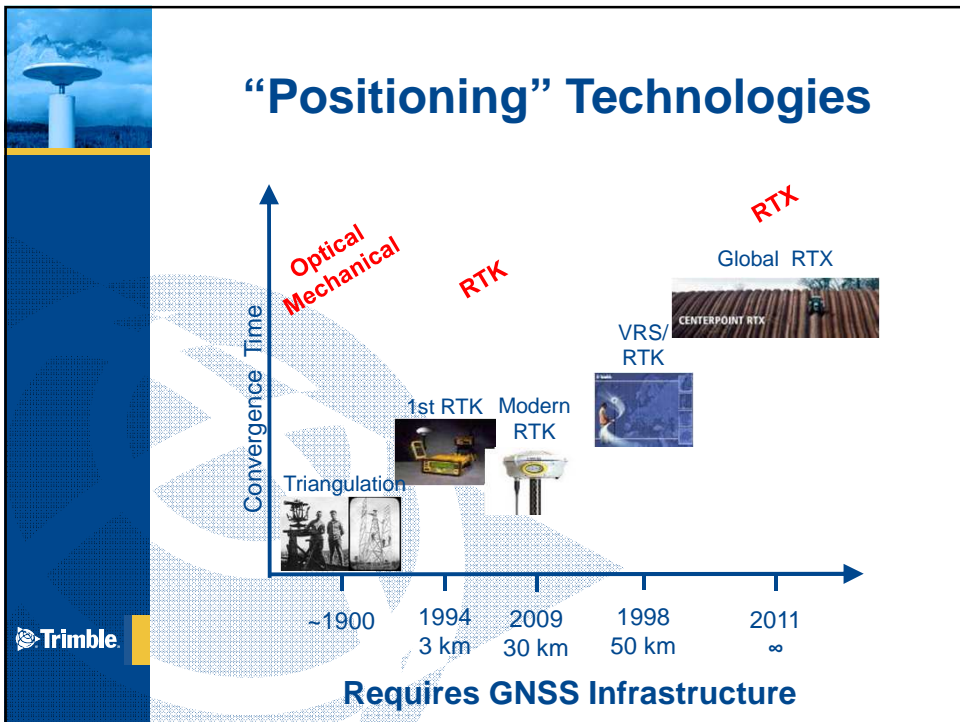


**Trimble**

## CORS networks today and tomorrow— latest improvements and applications

**May 2013**

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# GNSS Infrastructure

- Facilitates the production of goods and services and the distribution of finished products to markets

- **Generic Infrastructure**

- Cellular Towers
- Intersecting Highways
- Power Grids
- Fibre Optic Backbone

**GNSS Infrastructure is the positioning backbone to enable high accuracy positioning → “Enabling Technology”**

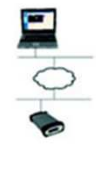


- **GNSS Infrastructure**

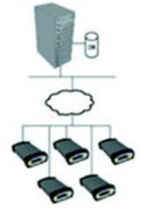
- GNSS Receivers
- Enterprise Class Servers
- Communication Links
- Enterprise Data Processing Software



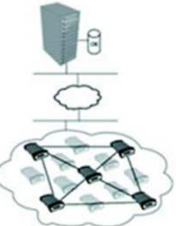
## RTN (Real Time Network) Solutions



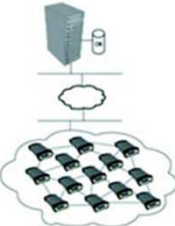
Single BASE-CORS  
Trimble NetR9™  
GNSS reference receiver



BASE-CORS Array  
Trimble Dynamic Control App



SparseVRS Network  
Trimble SparseVRS



VRS Network  
Trimble VRS'Net™ App


Post Processing	DGPS VRS	Sparse VRS	VRS
Coverage – 500km	Coverage – 300km	Station spacing – 120km	Station spacing 50-60 km
Accuracy – 2mm+2ppm	Accuracy – < 0.5m	Accuracy – < 0.1m	Accuracy – 2cm
Occupation – several minutes	Occupation – 5 – 10 secs	Occupation – 5 – 10 secs	Occupation 5-10 secs

## Classic Applications for CORS Networks:

- Surveying
- Mapping and GIS
- Construction

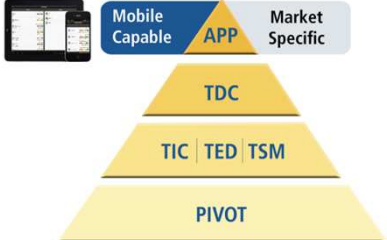
## New Applications for CORS Networks:

- Deformation monitoring
- Atmospheric research
- Precision farming
- Fleet tracking
- Other?



# Trimble PIVOT

- Software to operate Virtual Reference Station networks based on 14 years experience in Network-RTK
- Scalable software platform with modular approach



The diagram illustrates the PIVOT software architecture as a pyramid with four levels. The base level is labeled "PIVOT". The second level from the bottom is labeled "TIC | TED | TSM". The third level is labeled "TDC". The top level is labeled "APP" and is further divided into two sub-sections: "Mobile Capable" and "Market Specific". To the left of the pyramid, there is an icon representing a tablet and a smartphone.



# New Applications





## Deformation monitoring with VRS Networks

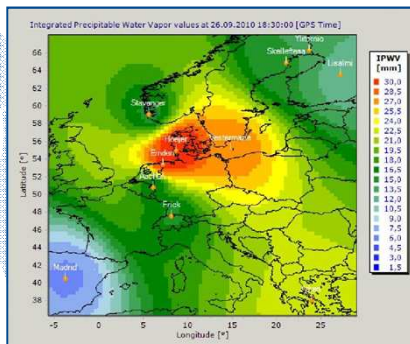


Aging civil infrastructure requires on-going inspection and maintenance.



## Atmospheric research

- Integrated Precipitable Water Vapor (IPWV)
- Total Electron Content (TEC)



[Trimble Atmosphere App](#)

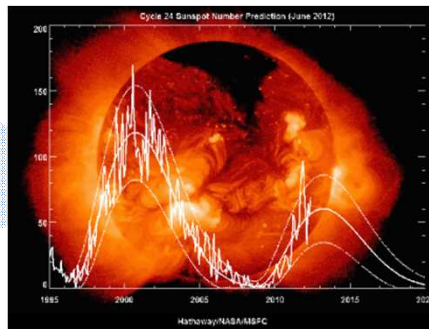
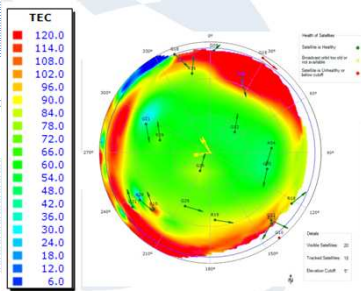




# Ionosphere App



- Calculation and display of Ionosphere activity
- Ionosphere activity and scintillation highly impact GNSS signals
- Deactivation of critically affected satellites
- Solar max expected in the next two years



# Mobile Communication App



- Mobile Gate module to interface to mobile Apps







## Recent software improvements - new satellite constellations

- **Additional Satellite Signals**
  - GPS L2C, L5
  - GLONASS improved L2, third frequency
  
- **New Satellite Systems**
  - GALILEO
  - COMPASS, BEIDOU
  - QZSS (Quasi Zenith Satellite System)
  - IRNSS (Indian Regional Navigation Satellite System)



## Recent hardware improvements

- New constellation support (GPS, Glonass, Galileo and others)
- 440 channels to be ready for upcoming satellite constellations
- New standards to be supported such as USB, HTTPS or Power over Ethernet





## Recent hardware improvements

- Reduction in power consumption (3.8 W)
- Increasing autonomous runtime (>12 hours)
- Increasing flexibility with multiple different configurations



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## THIS IS NOT THE END

More questions?  
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Visit: <http://www.trimble.com/Infrastructure>

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