

Evaluation of the Existing CORS Network Infrastructure in Singapore to Meet User Demand

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Objective

- Why need to review?
 - To stay relevant and meet users need
 - To be sustainable
 - SiReNT is a 5-year old system
 - Understand user demand in next 5 to 10 years
- What do we do?
 - Strategic review of the existing national CORS network - SiReNT
 - Systematic and comprehensive
 - Area of review include: Technology, System, Policy and Business Model
- What is the outcome?
 - Provides us with a basis to decide on the required enhancement to the system
 - Strategic and focus direction for operator to move forward

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What is SiReNT?



Singapore Satellite Positioning Reference Network

- SiReNT is Singapore's National Positioning Infrastructure that provides
 - consistent mapping coordinate system
 - fast, reliable and high accuracy positioning
- Started as a research project with NTU since 1999
- SiReNT was operationally implemented in 2006
- Primary objective is to support our national cadastral survey system

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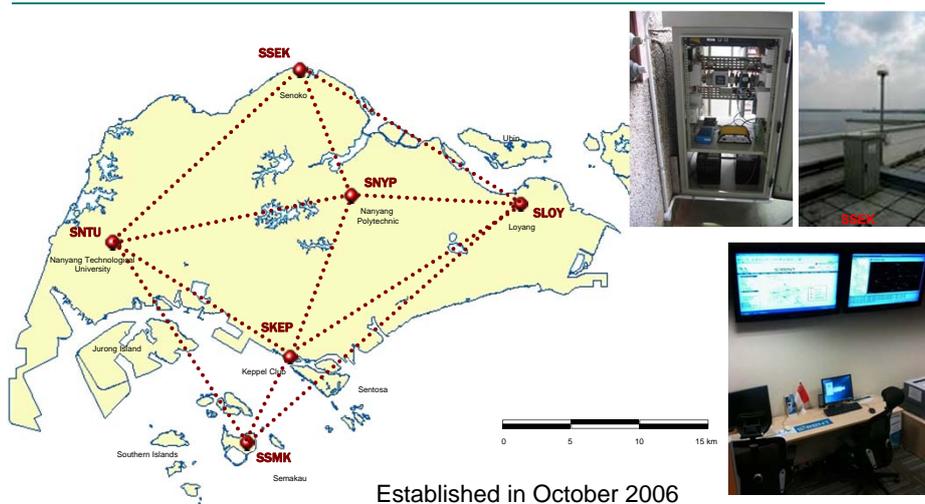
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SiReNT Network



Singapore Satellite Positioning Reference Network



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SiReNT Applications



- SiReNT are used in:
 - Survey and Mapping
 - GIS data collection
 - Navigation and tracking
 - Deformation monitoring
 - Atmospheric monitoring



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SiReNT Users



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Strategic Review

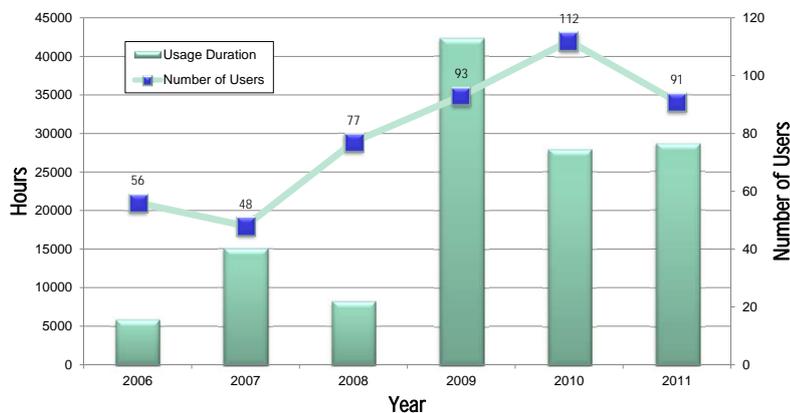


- Current and future (potential) usage
- Technology
 - GNSS, IT system and Communication
- System
 - Relevant components
 - Processes
 - Performance
- Policy and Business Model

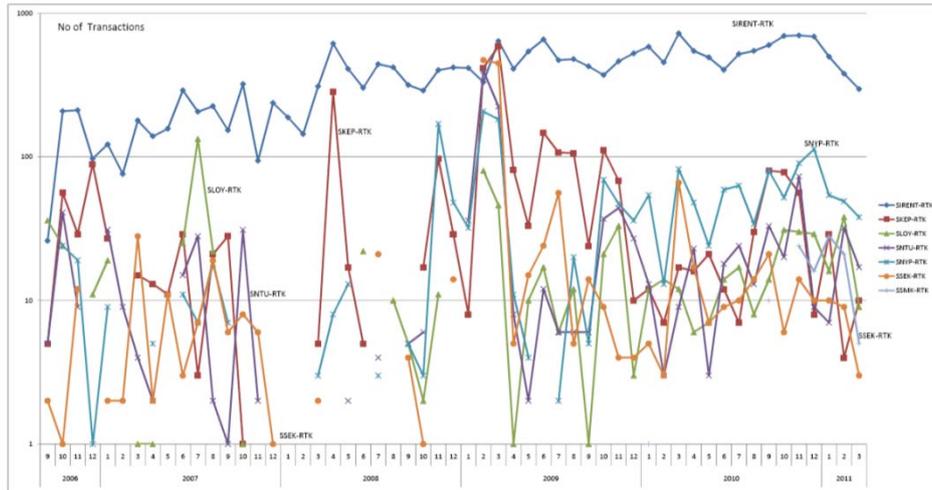
SiReNT Usage



Total Usage and Number of Users

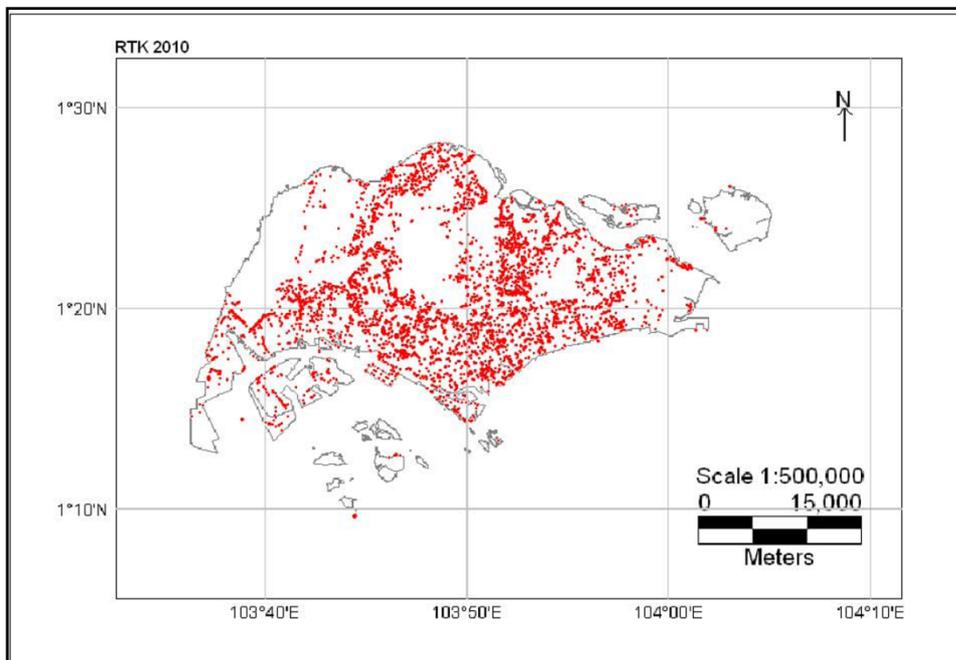


Usage of Different Mount Points for RTK



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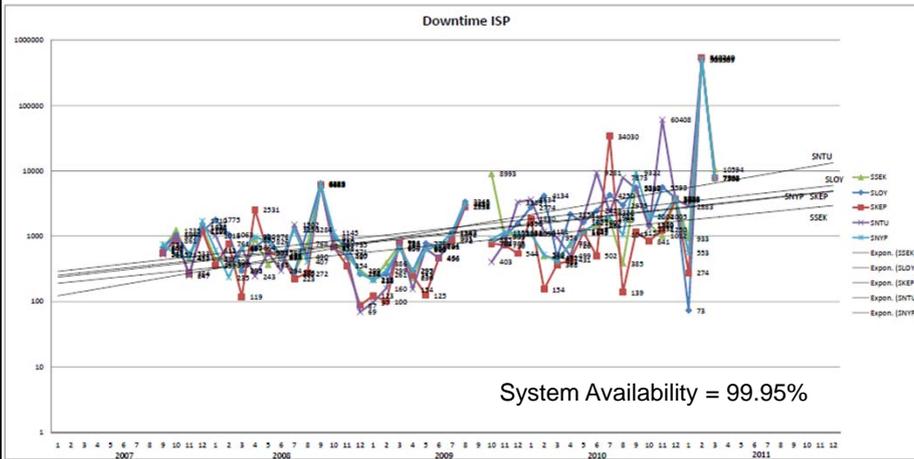
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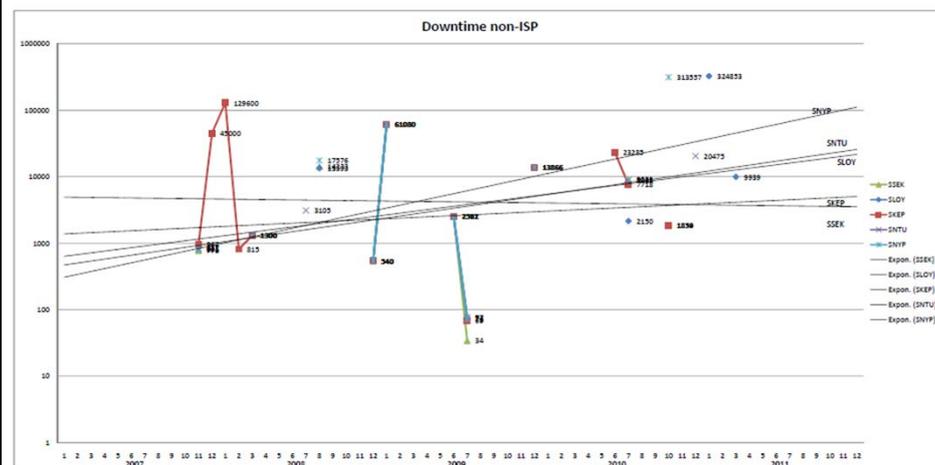
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Station Downtime Caused by Communication Link



Station Downtime Caused by Other Factors



New Applications

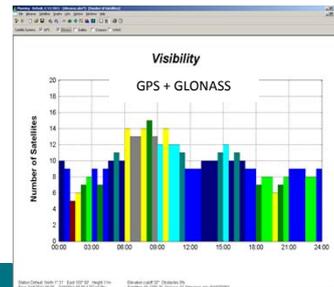
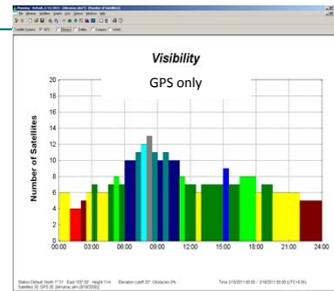


- Satellite-based Electronic Road Pricing (ERP)
- Emergency Response
- National Parks Mapping
- Utilities Asset and Inventory Management
- Container Port Management
- GNSS Aircraft Landing System
- Coastline protection and coastal subsidence monitoring
- Road Inventory Management and Mapping
- Automated Parking Enforcement
- Environmental Mapping

Adopt GNSS



- Adopt GNSS to mitigate
 - Urban canyon problem
 - Garden city problem



Review of System



- Hardware
- Software
- CORS site location (including tendency agreements)
- Data Flow
- Network Connectivity
- Power Management
- Housing of the Equipment (Protection)
- System Performance which is a factor of System Redundancy and Availability
- System Integrity and Reliability
- Periodic Maintenance Plan

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Review of Policy and Business Model



- Business model;
- Type of Services;
- Stakeholder Engagement;
- Promotion Scheme; and
- Terms and conditions.

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New Expectations / Requirements



- More users
- Diverse applications
 - More telematics and tracking applications
 - Monitoring applications
- Safety-of-life-critical and Liability-critical applications (including financial transactions)

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What do we need to stay relevant?



- To ensure that the system meet users need in next 5 to 10 years
 - Adopt GNSS – to increase satellite availability
 - Increase system reliability and availability
 - Remote Integrity monitoring
 - Comprehensive and real-time system information for users

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Summary



- SiReNT as national positioning infrastructure is key component of National SDI
- SiReNT must stay relevant in supporting various positioning applications
- SiReNT's policy and business model must ensure that the infrastructure is sustainable

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Thank you



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