



Toknav

VRS CORS Solution

- **Professional Original Equipment Manufacturer**
- **Original Design Manufacturer**



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1. Company Introduction

Guangzhou TokSurvey Information Technology Co., Ltd. was founded in 2019 and by a team of R&D engineers. We are a domestic technology leader in related fields in China and a system integration supplier in the global market. We are committed to producing high-precision satellite positioning terminal products.

TOKNAV products are trusted by customers for their accuracy, reliability, and portability, and are widely used in the fields of surveying and mapping, precision agriculture, unmanned vehicles, automatic control of construction machinery, and deformation monitoring.



1. Company Introduction

We strictly control each step of the product quality control process, such as Production Material Control (PMC), InPut Process Quality Control (IPQC), Quality Control (QC) and Quality Assurance (QA),

Many products have passed CE, NGS, IGS, KC and other certifications, and are exported to more than 60 countries and regions around the world. Our products are well received in the global market, and now we have become a system intergration supplier in the global market.



2. What is VRS CORS Services?

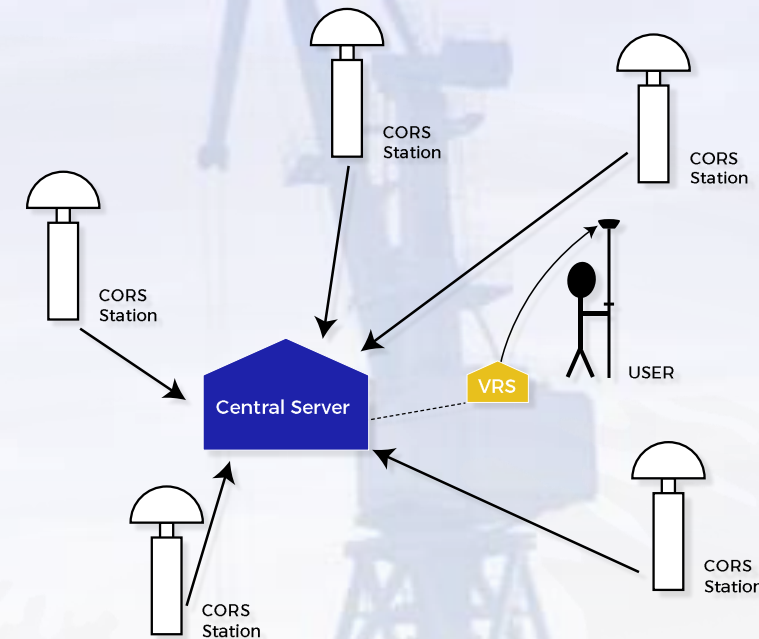
Definition

VRS, named as **Virtual Reference Station**, is a kind of Network Real Time Kinematic (NRTK) technology

- VRS generate and provide a virtual reference station data near user's position based on the regional real reference station for user to calculate RTK.
- VRS requires 3G/4G/5G to support communication.

Features

- Instant access to Real-Time Kinematic (RTK) corrections
- Centimeter-accurate corrections tailored to your geographic location
- Built-in redundancy to ensure connectivity, consistency and quality
- Cost-effective and simple to use
- Professionally-managed and secure
- Streamlined workflows, done right the first time

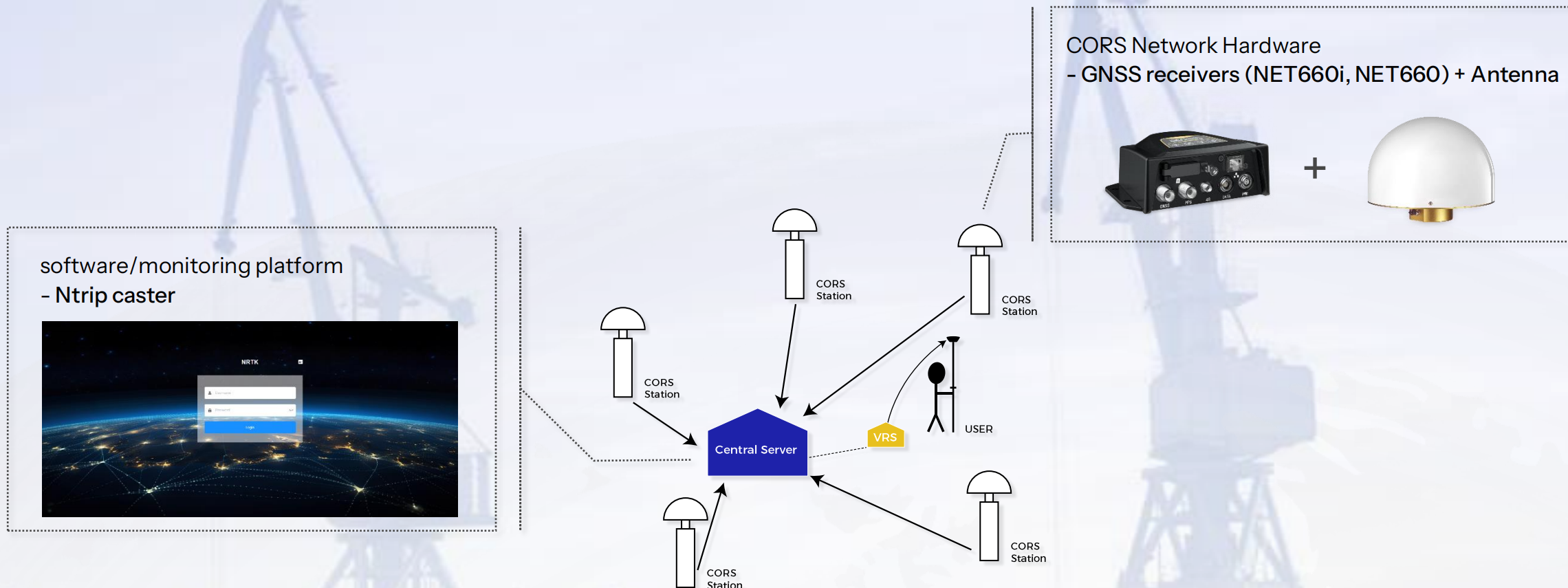


Pic 2-1 VRS CORS System



2. What is VRS CORS Services?

VRS CORS Structure





3. VRS CORS Hardware

- NET660i GNSS Receiver

Characteristic

- Based on Linux+Qualcomm Cortex-A7 intelligent system platform
- 1408 super channels
- Support BDS, GPS, GLONASS, GALILEO and QZSS
- Enhanced full constellation RTK technology
- Built-in 32G storage
- Support secondary development
- Solid magnesium alloy shell
- IP65 design requirements, safe and reliable



Pic 3-1 Net660i Packaging



Pic 3-2 Net660i Working schematic

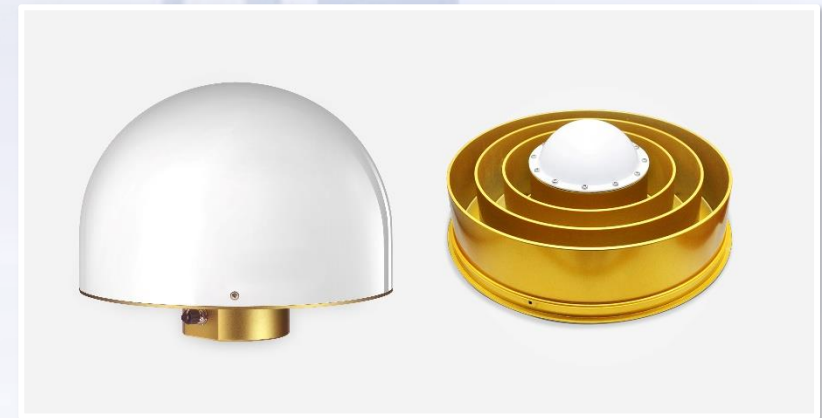


3. VRS CORS Hardware

- TCA920 Choke Ring Antenna

Characteristic

- High performance GNSS antenna for base station that covers full frequency satellite signal tracking of GPS, GLONASS, GALILEO, BDS, QZSS, IRNSS, SBAS as well as L-Band correction service.
- A mini choke ring antenna with strong multipath suppression performance
- Specifically designed for applications as land and marine surveying, channel surveying, earthquake and landslide monitoring, deformation monitoring, and wharf container operations that require absolute positioning accuracy and multi-constellation support.



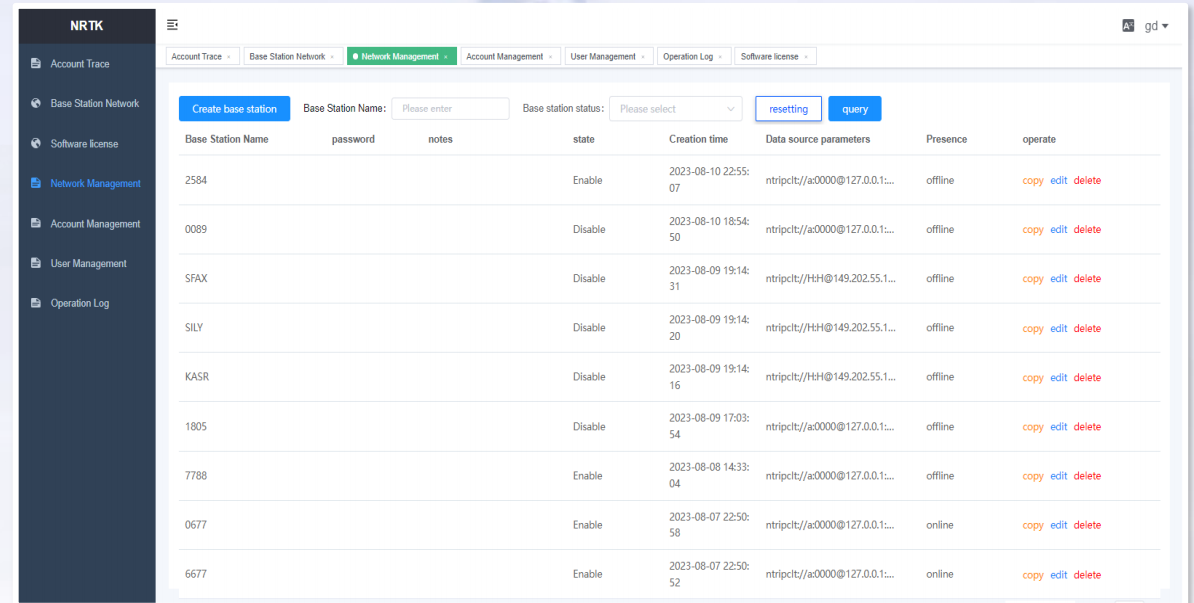
Pic 3-3 TCA920

4. TOKNAV VRS CORS Software/Monitoring Platform

- NTRIP caster

Monitoring Platform Features

- Web UI Platform
- Network Monitor
- Data processing Monitor
- User Monitor
- Support millions of concurrent



The screenshot shows the NRTK web interface with a sidebar menu and a main content area. The sidebar menu includes: Account Trace, Base Station Network, Software license, Network Management, Account Management, User Management, and Operation Log. The main content area displays a table of base station configurations under the 'Network Management' tab. The table has columns for Base Station Name, password, notes, state, Creation time, Data source parameters, Presence, and operate. The table contains 10 rows of data.

Base Station Name	password	notes	state	Creation time	Data source parameters	Presence	operate
2584			Enable	2023-08-10 22:55:07	ntripctl://a0000@127.0.0.1...	offline	copy edit delete
0089			Disable	2023-08-10 18:54:50	ntripctl://a0000@127.0.0.1...	offline	copy edit delete
SFAX			Disable	2023-08-09 19:14:31	ntripctl://HH@149.202.55.1...	offline	copy edit delete
SILY			Disable	2023-08-09 19:14:20	ntripctl://HH@149.202.55.1...	offline	copy edit delete
KASR			Disable	2023-08-09 19:14:16	ntripctl://HH@149.202.55.1...	offline	copy edit delete
1805			Disable	2023-08-09 17:03:54	ntripctl://a0000@127.0.0.1...	offline	copy edit delete
7788			Enable	2023-08-08 14:33:04	ntripctl://a0000@127.0.0.1...	offline	copy edit delete
0677			Enable	2023-08-07 22:50:58	ntripctl://a0000@127.0.0.1...	online	copy edit delete
6677			Enable	2023-08-07 22:50:52	ntripctl://a0000@127.0.0.1...	online	copy edit delete



5. Application Scenario



Government

Geodetic measurement and Mapping
Municipal Management



Economy

Public location-based services
Logistics management



Transportation

Navigation
Traffic management and auto drive



Agriculture

Precision agriculture
Intelligent agriculture





6. Advantage of Our Technology



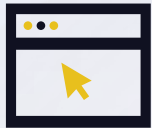
High accuracy

We are the industry leader in providing centimeter-level accuracy.



High stability

Our reliable network ensures you have uninterrupted connectivity.



Easy to use

Our products have friendly interface and simple operation.
We can provide a trial version of the software for testing.



Strong compatibility

We have strong research and development capabilities.
We can build a complete VRS-CORS system in any region.





6. Advantage of Our Technology

- Industry-leading technology and products



Full-stack self-developed software and hardware technology

- The algorithms, software, and hardware used in our VRS service are independently developed.



Maintain a leading position in terms of VRS service performance in China

Landing time	Hard point	Coordinate frame	Equipment	Upload traffic(KB)	Differential flow(KB)	Fixed convergence time	State proportion	Controls
2023-08-09 14:50:59	RTCM33G	008wrtly psh-hple e-rtcm3	M66LITE- FM902.6 5.2308.18 5	171.77	1.12	3.000000	7.Fix:0.0000 DIF:0.0000 IN:0.0000 v:0.0000 p:0.6923	GGA Download

Account	Upload traffic(KB)	Differential flow(KB)	Fixed convergence time
aa	171.77	1.12	3.000000

Basic information:

Account: aa
 Account type: Fix
 GGA delay(s): -22.5500
 Upload traffic(KB): 126.60
 Current position time: 2023-08-09 14:50:47
 Landing time: 2023-08-09 14:50:59
 Common satellite number: 44

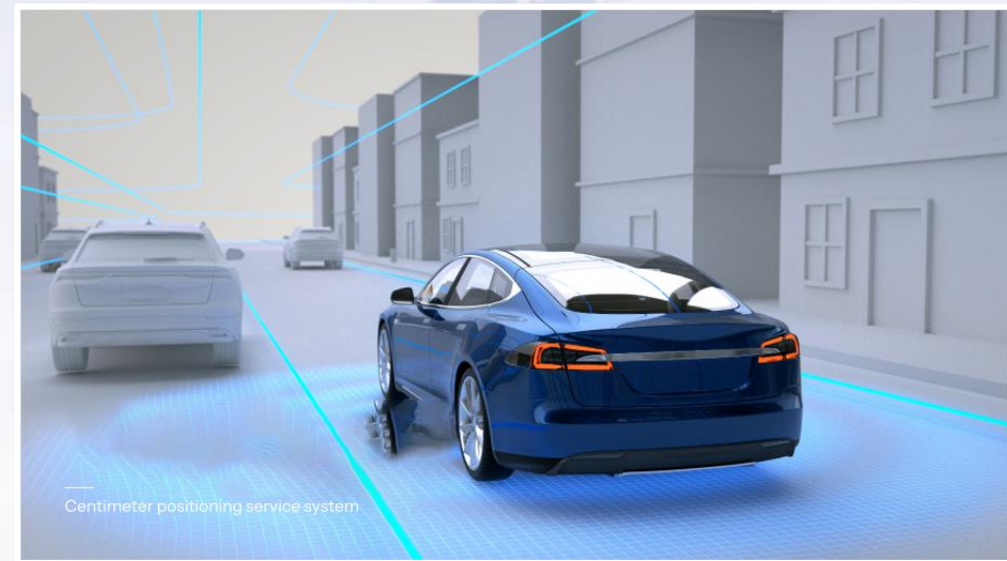
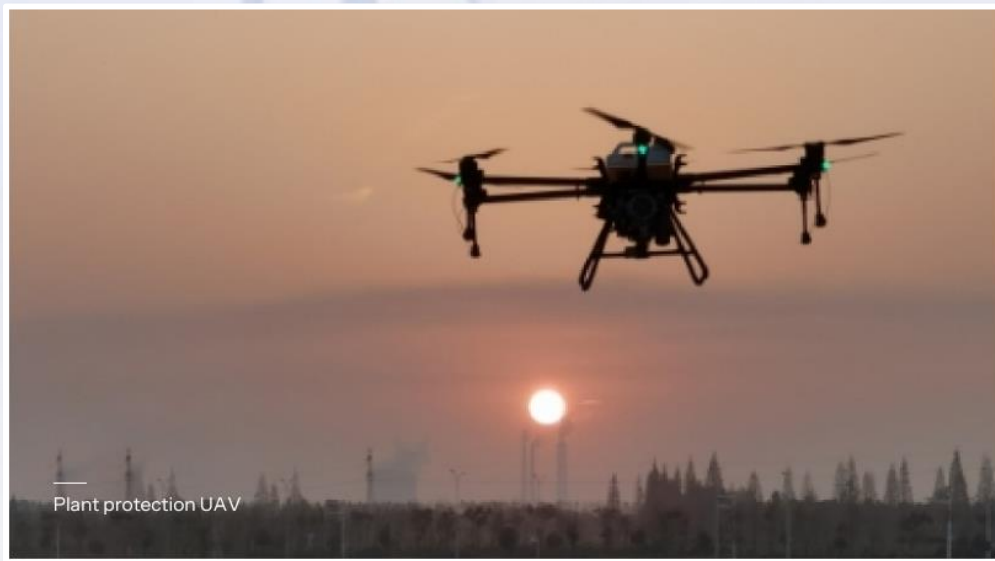


6. Advantage of Our Technology

- Meeting various high-precision application needs

Serves diverse terminal users with 1600 operational reference stations in China:

- Includes surveying users, agricultural drones for crop protection, building monitoring, geological disaster monitoring, car lane-level navigation, electric bicycles, and other types of users.

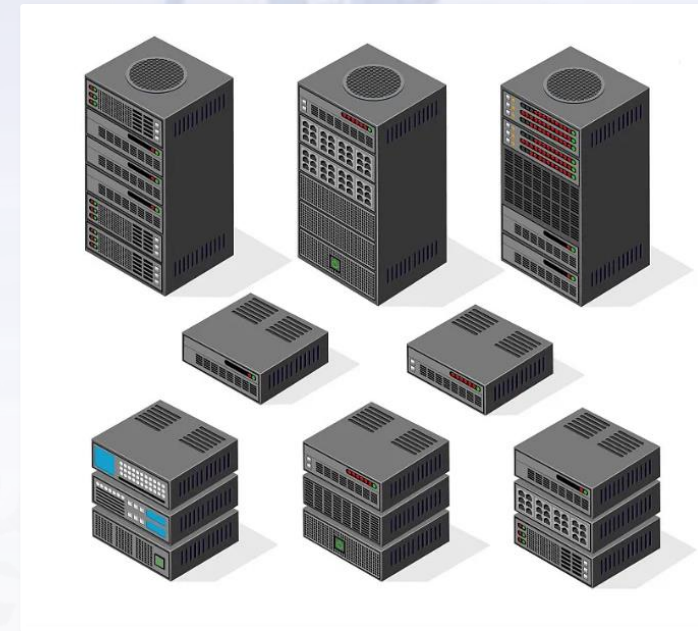
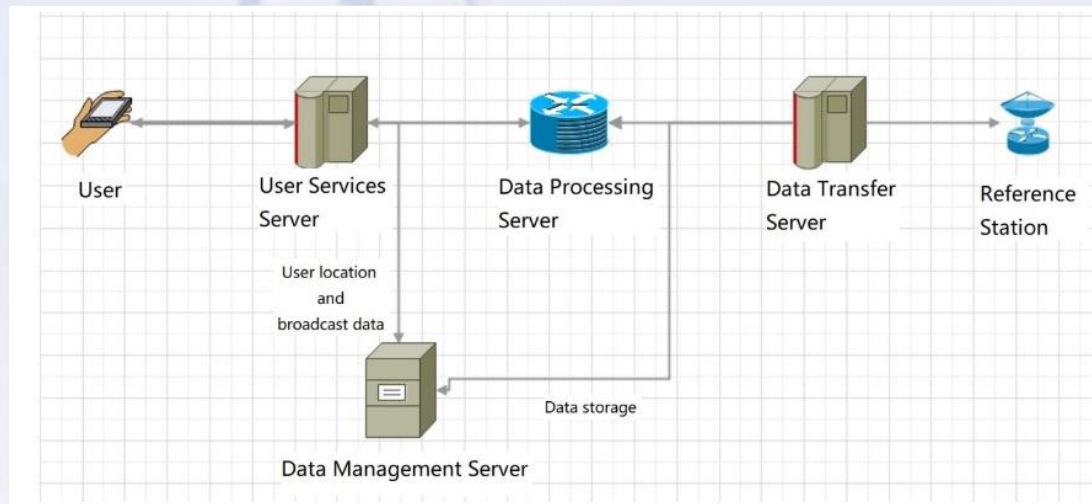


6. Advantage of Our Technology

- Ability to serve a massive number of users

Utilizes a distributed architecture

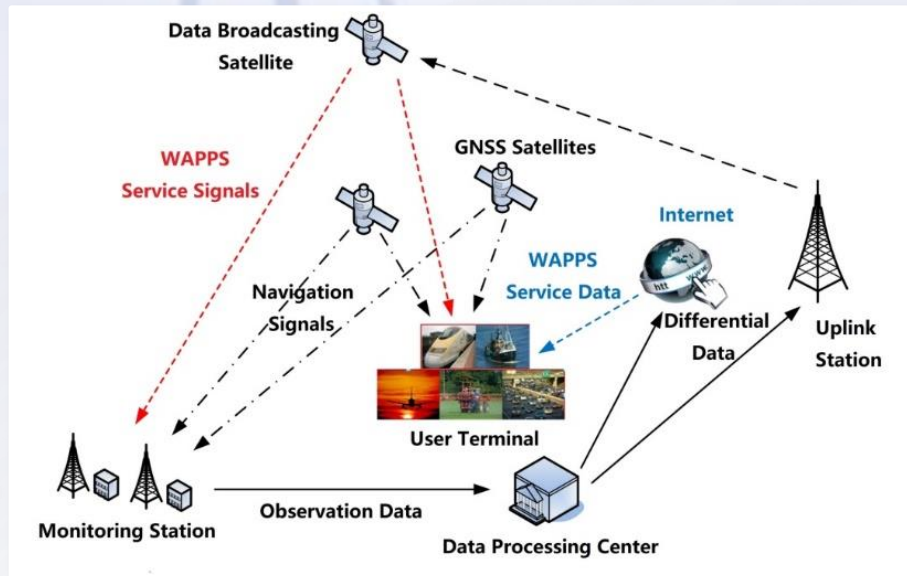
- Data management, data processing, and user services are independent of each other through a data bus.
- Not only possesses powerful service capabilities of individual servers, but also supports a massive number of concurrent users through server expansion.



6. Advantage of Our Technology

- Capability of Satellite-based and Ground-based fusion processing

- Capable of satellite-based and ground-based fusion processing, enabling network RTK and PPP-RTK fusion processing.
- The head of the Kepler technology team is also the head of the IGS Analysis Center and IGS Data Center team at Wuhan University, possessing globally leading GNSS data precision processing capabilities.




IGS Analysis Centers (ACs)

Institution	Abbreviation	Country/Region
Natural Resources Canada	EMR	Canada
Wuhan University	WHU	China
Geodetic Observatory Pecny	GOP-RIGTC	Czech Republic
Space geodesy team of the CNES	GRG	France
European Space Agency/ESOC	ESA/ESOC	Germany
GeoForschungsZentrum	GFZ	Germany
Center for Orbit Determination in Europe	CODE	Switzerland
Jet Propulsion Laboratory	JPL	USA
Massachusetts Institute of Technology	MIT	USA
NOAA/National Geodetic Survey	NGS	USA
Scripps Institution of Oceanography	SIO	USA
U.S. Naval Observatory	USNO	USA

6. Advantage of Our Technology

- Capability of High-precision processing in low-latitude area

- Ensures high-performance positioning in low-latitude area through processing multi-GNSS data and refining ionospheric models.
- The head of the Kepler technology team is also the head of the IGS Ionospheric Analysis Center and IGS MGEX Analysis Center at Wuhan University.



Multi-GNSS Working Group

Established: 2003

Chair: Oliver Montenbruck

Mailing List: [IGS Multi-GNSS Working Group Mailing List](#)



Ionosphere Working Group

Established: 1998

Chair: Andrzej Krankowski

Charter: [Ionosphere Working Group Charter](#)

Mailing List: [IGS Ionosphere Working Group Mailing List](#)

Website: [IGS Ionosphere Working Group](#)

Tim Springer	PosiTIm (@ESA/ESOC)	Germany	Selected data analyses
Peter Steigenberger	DLR	Germany	Broadcast ephemerides and DCB product
Andrea Stürze	BKG	Germany	Data quality control, real-time streams
Ningbo Wang	AIR/CAS	China	DCB product
Qile Zhao	Wuhan University	China	BeiDou

Robert Weber	TU Wien
Pawel Wielgosz	UWM
Brian Wilson	JPL
Yunbin Yuan	CAS
Qile Zhao	WHU



6. Advantage of Our Technology

- Capability of processing large-scale reference station

- Equipped with 1600 reference stations.
- Provides large-scale network RTK services covering most regions of China.
- Possesses extensive engineering experience in delivering stable services to various users nationwide.





6. Advantage of Our Technology

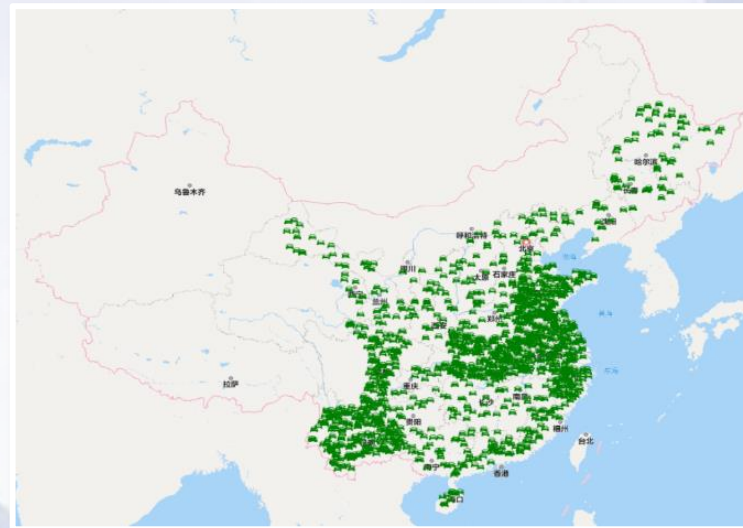
- Rich operating experience in serving large users and large areas

Our Network cover most area of China

- With over 1600 station.

Our VRS service can support large-scale users

- Supply VRS service to millions of users simultaneously.



- Rich operating experience in serving large users and large areas

Practical example -VRS Services in China

Network Features

- Independently develop
- More than 1600 stations
- Cover most areas of China
- Support Multi-GNSS
- Adaptive network construction technology
- Operational 24 hours a day, 7 days a week





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