

CHC CORS Solution



1. Hardware Solution

2. Software Solution

P2E settings

- Network Configuration
- Access to Web UI
- Antenna Configuration
- Reference Station Setting
- I/O Setting



P2E settings

- Connect P2E with PC via GPS to PC data **serial** cable
- Run **WinFlash** and setting by **Configure Ethernet settings**
- Set receiver **IP**, **port** and other parameters which can help you access to BD970 web through http protocol
- Or set network parameters via WebUI directly



The screenshot shows a dialog box titled "Ethernet Configuration" with a close button (X) in the top right corner. The dialog is divided into two sections: "Ethernet settings" and "HTTP settings".

Ethernet settings:

- IF Setup: Static IP address (dropdown menu)
- IP Address: 192 . 168 . 30 . 174
- Netmask: 255 . 255 . 255 . 0
- Broadcast: 192 . 168 . 30 . 255
- Gateway: 192 . 168 . 30 . 1
- DNS: 192 . 168 . 0 . 5

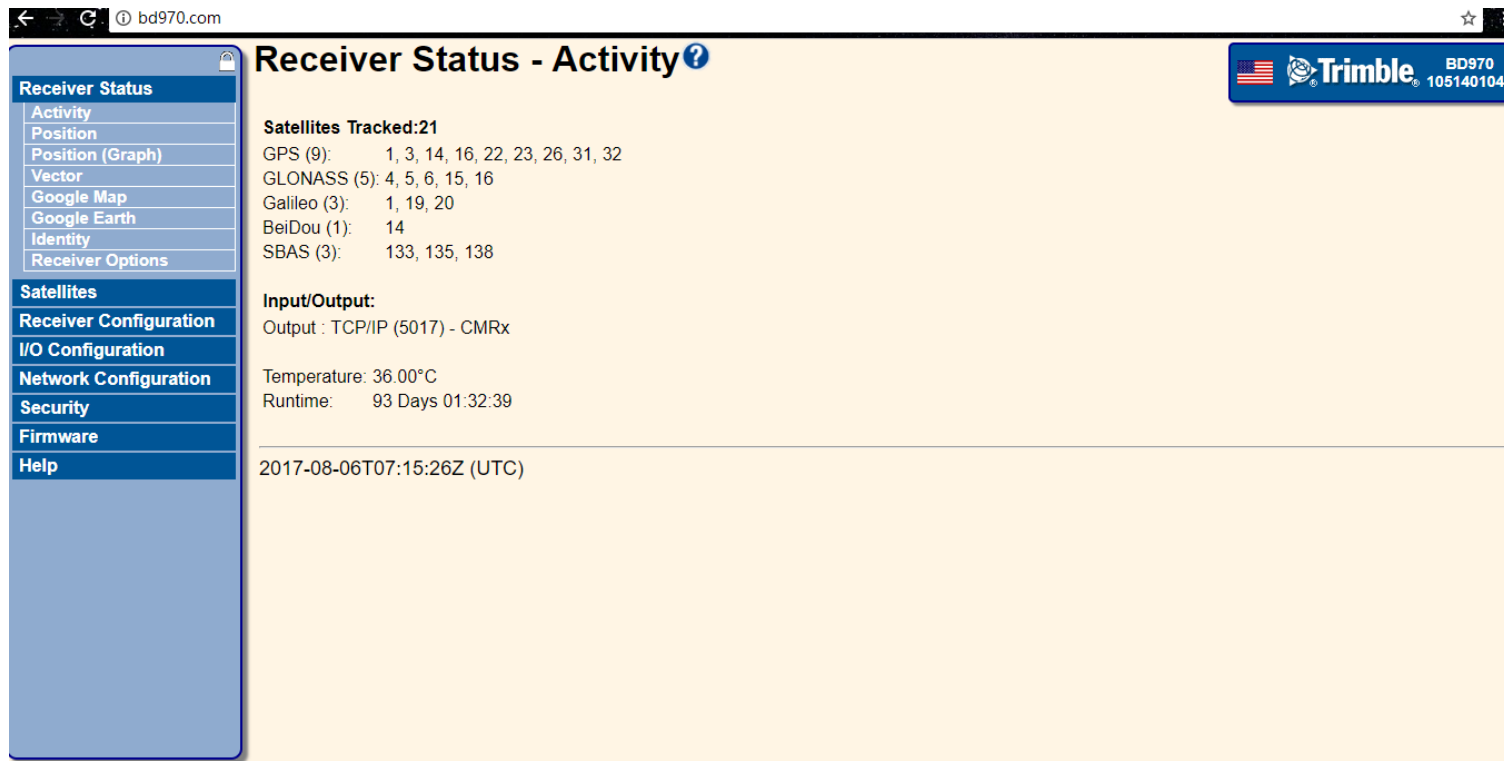
HTTP settings:

- Server: 80

At the bottom of the dialog, there are two buttons: "OK" and "Cancel".

P2E settings

- Type in receiver IP and port in browser
- Access to Trimble Web UI
- Login as Admin (Default User name: **admin**, Default Password: **password**)



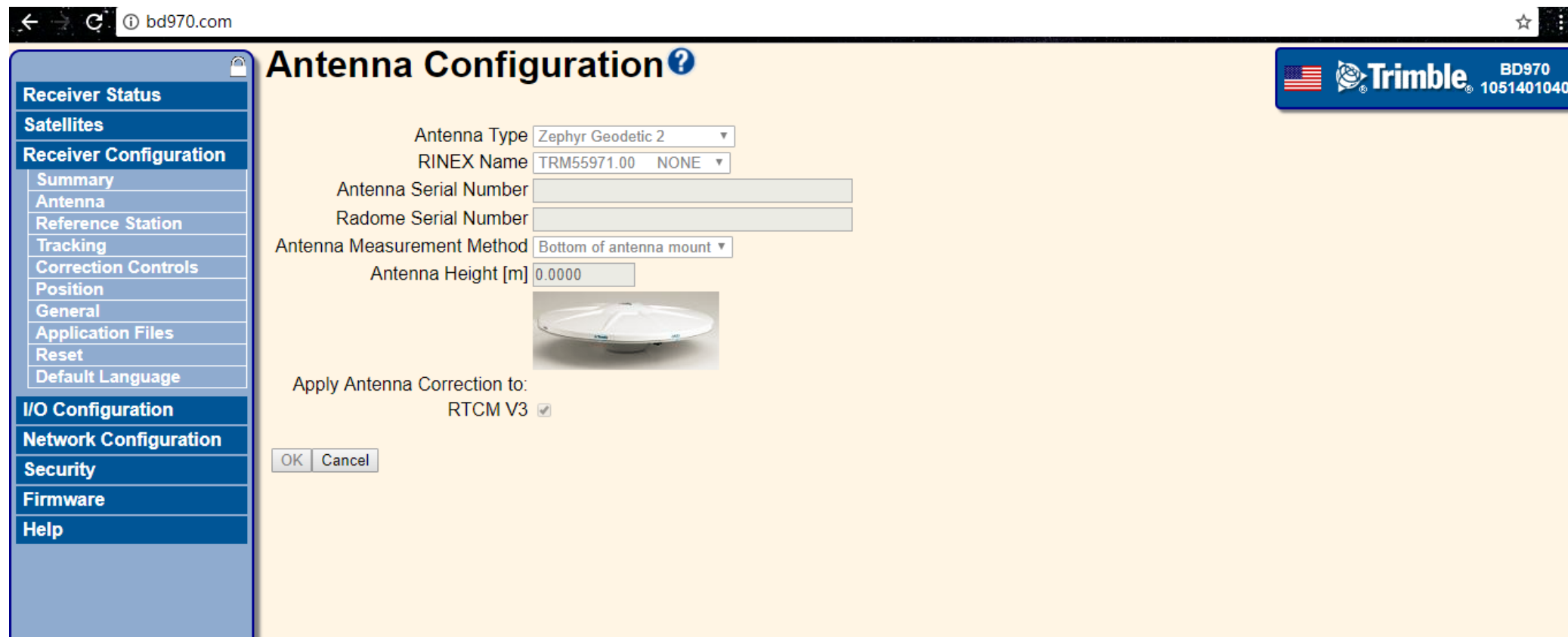
The screenshot shows the Trimble Web UI for a receiver. The browser address bar displays "bd970.com". The page title is "Receiver Status - Activity". A left-hand navigation menu includes: Receiver Status, Activity, Position, Position (Graph), Vector, Google Map, Google Earth, Identity, Receiver Options, Satellites, Receiver Configuration, I/O Configuration, Network Configuration, Security, Firmware, and Help. The main content area displays the following information:

- Satellites Tracked:21**
 - GPS (9): 1, 3, 14, 16, 22, 23, 26, 31, 32
 - GLONASS (5): 4, 5, 6, 15, 16
 - Galileo (3): 1, 19, 20
 - BeiDou (1): 14
 - SBAS (3): 133, 135, 138
- Input/Output:**
 - Output : TCP/IP (5017) - CMRx
- Temperature: 36.00°C
- Runtime: 93 Days 01:32:39

A timestamp at the bottom of the page reads: 2017-08-06T07:15:26Z (UTC). The Trimble logo and model number "BD970 1051401040" are visible in the top right corner of the page.

P2E settings

- Click **Receiver Configuration-Antenna** to enter antenna configuration interface
- Set Antenna Type, Measurement Method and Antenna Height



The screenshot displays the "Antenna Configuration" interface. The browser address bar shows "bd970.com". The interface includes a sidebar with the following menu items: Receiver Status, Satellites, Receiver Configuration (selected), Summary, Antenna, Reference Station, Tracking, Correction Controls, Position, General, Application Files, Reset, Default Language, I/O Configuration, Network Configuration, Security, Firmware, and Help. The main configuration area is titled "Antenna Configuration" and features a "Trimble" logo with the model "BD970" and ID "1051401040". The configuration fields are as follows:

- Antenna Type: Zephyr Geodetic 2 (dropdown)
- RINEX Name: TRM55971.00 NONE (dropdown)
- Antenna Serial Number: (text input)
- Radome Serial Number: (text input)
- Antenna Measurement Method: Bottom of antenna mount (dropdown)
- Antenna Height [m]: 0.0000 (text input)
- Apply Antenna Correction to: RTCM V3 (checkbox checked)

At the bottom of the configuration area, there are "OK" and "Cancel" buttons. A small image of the Zephyr Geodetic 2 antenna is shown below the height field.

P2E settings

- Click **Receiver Configuration-Reference Station** to enter reference station setting page
- Type in **fixed coordinates** or acquire a **current position**
- Click OK to finish setting

The screenshot shows the 'Reference Station' configuration page. On the left is a navigation menu with categories: Receiver Status, Satellites, Receiver Configuration (selected), I/O Configuration, Network Configuration, Security, Firmware, and Help. Under 'Receiver Configuration', sub-items include Summary, Antenna, Reference Station, Tracking, Correction Controls, Position, General, Application Files, Reset, and Default Language. The main area is titled 'Reference Station' and contains the following fields and options:

- CMR ID: 0
- RTCM 2.x ID: 0
- RTCM 3.x ID: 0
- Station Name: INTECH
- Station Code: InTech
- Positioning mode: Cartesian Geographical
- Reference Latitude: 39° 53' 49.56422" N S
- Reference Longitude: 105° 6' 56.90118" E W
- Reference Height: 1671.365 [m]
- Buttons: Load Current Position, Load Average Position

Position Averaging results are displayed at the bottom:

Current Position:

Lat	39° 53' 49.57484" N
Lon	105° 6' 56.92109" W
Hgt	1670.160 [m]

Average Position:

Time	93d 1h 44m 31s
Lat	39° 53' 49.56237" N
Lon	105° 6' 56.91372" W
Hgt	1671.387 [m]

P2E settings

- Click **I/O Configuration** to enter I/O page
- Select **protocol** in list and set detail data **format** and transmission method

Receiver Status

Satellites

Receiver Configuration

I/O Configuration

Port Summary

Port Configuration

Network Configuration

Security

Firmware

Help

I/O Configuration ?

Type	Port	Input	Output
TCP/IP	5017	-	CMRx
TCP/IP	5018	-	-
TCP/IP	28001	-	-
TCP/IP	28002	-	-
NTRIP Client 1	-	-	-
NTRIP Client 2	-	-	-
NTRIP Client 3	-	-	-
NTRIP Server	-	-	-
NTRIP Caster 1	2101	-	-
NTRIP Caster 2	2102	-	-
NTRIP Caster 3	2103	-	-
Serial	COM1 (38.4K-8N1)	-	-
Serial	COM2 (38.4K-8N1)	-	-
Serial	COM3 (38.4K-8N1)	-	-
USB	-	-	-

BD970
1051401040

P2E settings

■ Configure the I/O settings

The screenshot displays the 'I/O Configuration' web interface. The left sidebar contains navigation links: Receiver Status, Satellites, Receiver Configuration, I/O Configuration (selected), Port Summary, Port Configuration, Network Configuration, Security, Firmware, and Help. The main content area is titled 'I/O Configuration' and includes the following settings:

- Server: TCP/IP 5017 | RT17/RT27 (dropdown)
- Server: TCP Port: 5017 | Delete
- Client
- Output only/Allow multiple connections
- Disable Nagle Algorithm
- UDP Mode
- Authenticate, set password:
- RT17:
 - Epoch Interval: Off (dropdown)
 - Measurements (annotated with '1+17')
 - Positions
 - Concise
 - R-T Flag
 - Send Raw GPS Data (annotated with '120S')
 - Send Raw SBAS Data
 - Include FLL Measurements
 - Options:
 - Multi-System Support
 - Smooth Pseudorange
 - Smooth Phase
 - Include Doppler
 - L2 Signal: Legacy with L2 - CS fallback (dropdown)
 - GPS Ephemeris: When new one is available (dropdown)
 - SBAS Ephemeris: When new one is available (dropdown)
- OK | Cancel



1. Hardware Solution

2. Software Solution

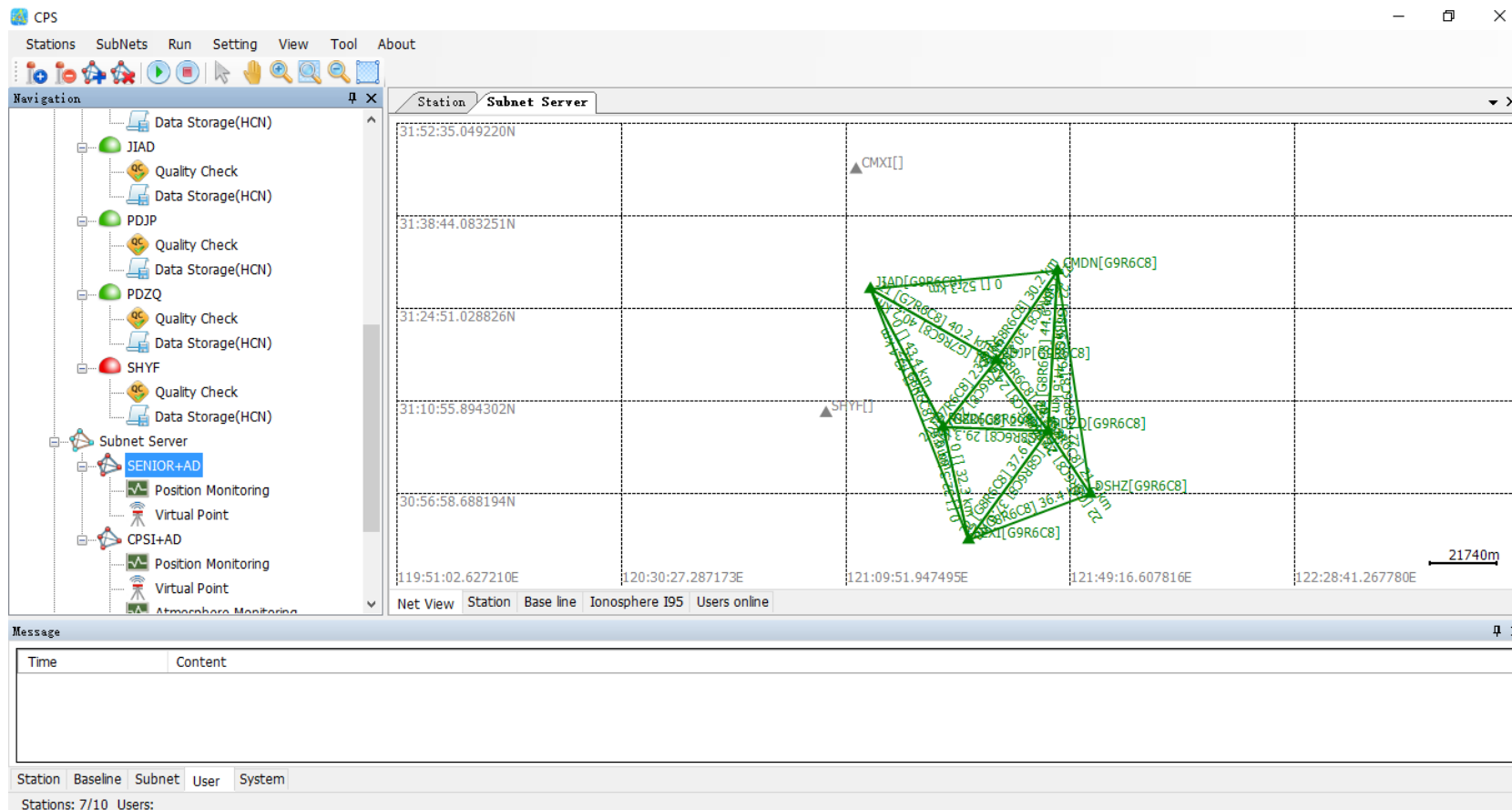
CPS key Feature

- Free combination of **GPS**, **GLONASS**, **BeiDou** and **Galileo**
- Compatible with reference receiver from various manufacturers.
- Distributed deployment to cover larger area and hold more users.
- Functionality modules delivers QC, virtual RINEX service, atmosphere and position monitoring solution.
- SQL server or Access database
- Physical server or virtual server
- Unlimited NTRIP accounts



CPS key feature

- CHC Precision Service (CPS) is the processing and resolving software for CORS reference stations and correction data.



CPS key Feature

Project	Detail
Reference Station compatibility	CHC, Trimble, Topcon, Novatel, Unicorecom, Ashtech, Comnav, Hemisphere, Septentrio ... Also support RTCM2.x and RTCM3.x data format
Various correction data support	Support RTD and RTK. Support RTCM 2.3/2.4/3.0/3.1/3.2 and RTCM3 1021-1027 messages is also available. CMR/CMR+, transmit SCMRx
Multiple communication protocol	Support TCP, UDP, NTRIP and Telnet.
Service solution	Support single station, Virtual mode, Original Diff Data .
Selectable modules for different requirements	For reference station, Quality Check module and Data Storage module is available; For subnet, Position Monitoring module and Virtual RINEX module is available

CPS modules

- **Quality Check Module** can help CPS administrator to find the problem in advance by **real-time** data quality check for each reference station.

Stations(PDZQ)						
Subnet Server		System Monitoring				
NO.	PRN	Use Ratio(%)	MP1(m)	MP2(m)	MP5(m)	nSlip
4	G07	98.6	0.43	0.39	0	130
5	G13	99.9	0.14	0.2	0	99999999
6	G15	99.9	0.25	0.26	0	99999999
7	G19	100	0.38	0.34	0	99999999
8	G20	99.8	0.27	0.28	0	99999999
9	G29	99.9	0.22	0.22	0	99999999
10	G30	99.8	0.49	0.48	0	99999999
11	R04	99.5	0.34	0.29	0	99999999
12	R05	99.5	0.29	0.26	0	99999999
13	R06	99.4	0.57	0.4	0	1850
14	R18	100	0.37	0.37	0	99999999
15	R19	99.6	0.32	0.28	0	99999999
16	R20	99.5	0.3	0.26	0	3700
17	R21	82.9	0.5	0.29	0	99999999
18	C01	99.9	0.1	0.07	0	99999999
19	C02	99.9	0.24	0.16	0	99999999
20	C03	99.8	0.17	0.15	0	3714

CPS modules

- **Data Storage Module** record the observation file from reference station.
- **Multiple** formats supported: Binary, RINEX 2.10, RINEX 3.02, compressed RINEX and HRC.
- Support FTP pushing.

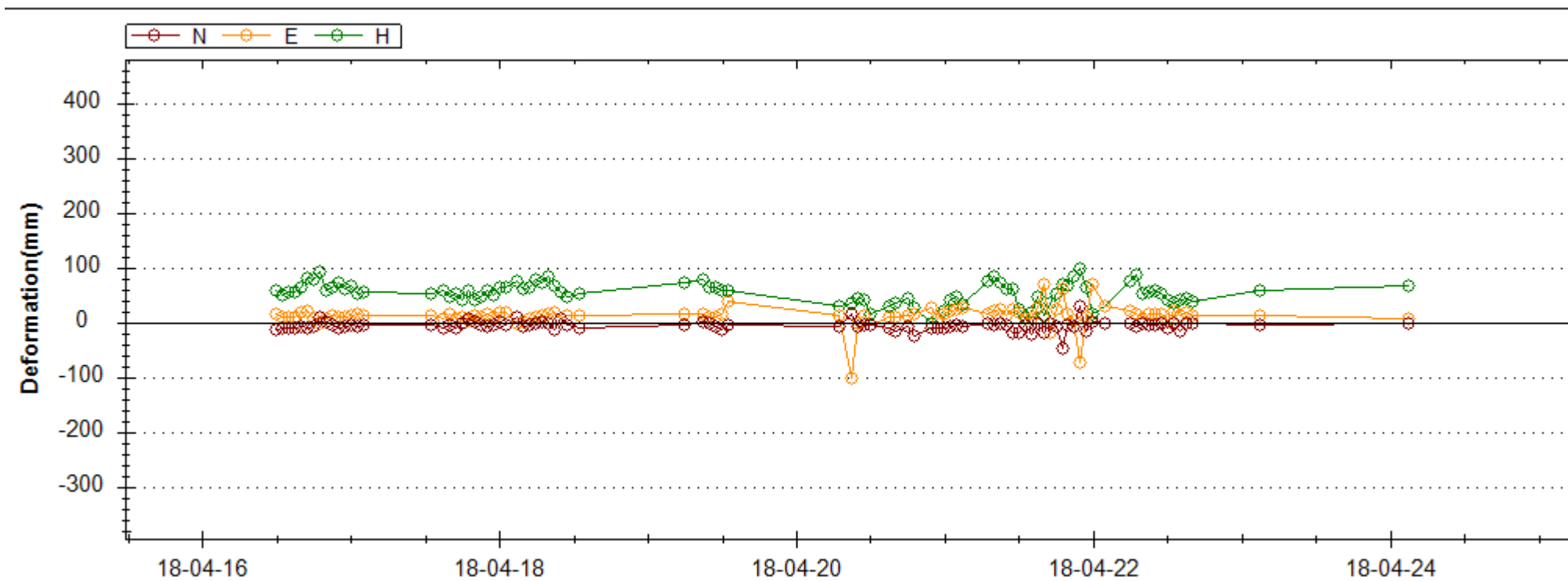
The screenshot displays the 'Data Storage' configuration window for a station named 'CMDN'. The interface is divided into several sections:

- Setting:** Contains various configuration options:
 - Is Running: Yes
 - System:
 - FileType: File TimeSpan(h): Delete Time(d):
 - Rinex Version: Data Interval(s): Compact:
 - Store Path:
 - FTPPush: FTPPath:
 - Auto Data Repair: Data Source:
- File Info:** Contains station-specific information:
 - Station Name: Anti Type:
 - Anti Height: m Current Epoch Time:
- Storage Path:** Shows the file path: and includes an button.

The bottom of the window shows the 'Data Storage' tab selected.

CPS modules

- **Position Monitoring Module** is designed to monitor the position deformation of the antenna. By post-processing the result of each station displacement will showed as table, graphs and stored in database.



CPS modules

- **Virtual Point Module** is designed to simulate a virtual reference station and log the raw data in Binary and RINEX format.

The screenshot shows the 'Virtual Point File Storage' configuration window. It includes the following settings:

- Enable
- Virtual Point Name: VB
- Time Span: 24
- Data Format: Binary Data
- Auto Delete Files: 60 Days ago
- Rinex Option**
 - Rinex Version: 3.02
 - Data Interval(s): 15
- System**
 - GPS
 - GLONASS
 - BDS
 - GALILEO
- Position**
 - B: 31:10:00.000000N
 - L: 121:30:00.000000E
 - H: 0.0000
- Limit Period**
 - Enable
 - Start Time: Friday, January
 - End Time: Friday, January

Buttons: OK, Cancel

Get started with CPS software



Running environment

- OS: WindowsXP/7/8/8.1/10, Server2008/Server2012 64-bit recommended
- RAM: recommend 16GB for 400 concurrent connections or even lower, 32GB for 1000 connections, 64GB for 4000 connections
- CPU: recommend Quad-core or higher, 2.5 GHz or higher
- Disk: 300MB for installation; recommend 30 GB for data storage (depending on how much update rate of observation file required) ;
- Environment: .NET Framework3.5, .NETFramework4.0, VisualC++, Runtime

Install database service

- Follow **SQL Wizard** to complete installation of database server
- Set **SQL Service-SQL Network Configuration-TCP/IP** properties
 - IP1&2 active and enable with TCP port in 1433
 - IPAll TCP port in 1433
- Set **SQL Service-SQL Native Client 11 Configuration-Client protocols-TCP** properties
 - Default port in 8804
- Run CPS to automatically create **EXAP** and **HCORS** database

CPS configuration

- The first time run CPS software, it will pop the warning tip 'Database error'.
- Don't worry, it just happens to every single server at first time.
- Go to **Setting-Project Setting** to connect to correct **database path**, **sa** and password.

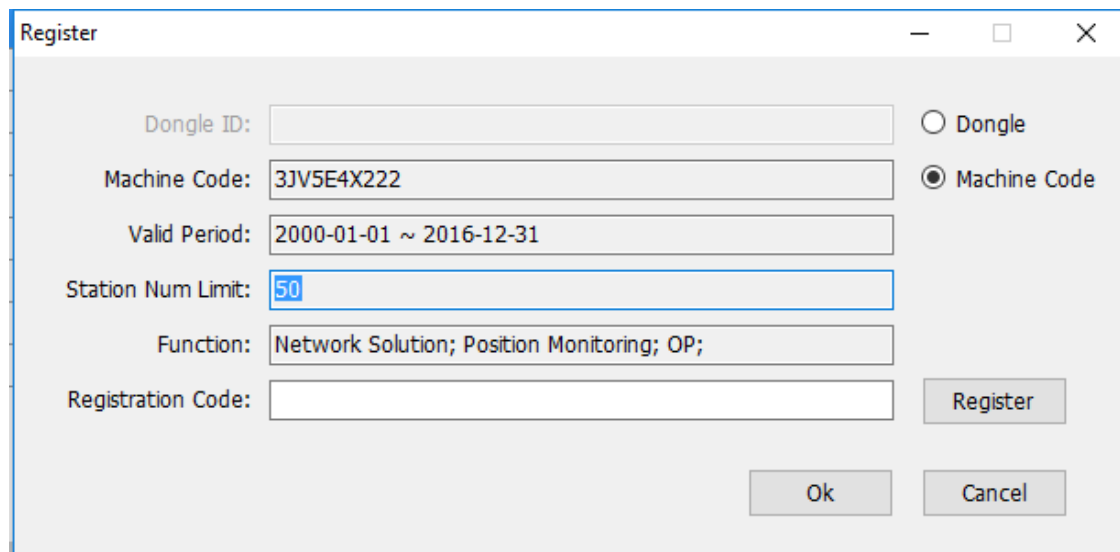
The screenshot shows the 'Setting' dialog box with the following configuration:

- Language: English
- Work Path: D:\CRNetWorkPath
- Running section:
 - Auto start all stations and nets when start software
 - Default UTC LeapSecond: 17
 - Use SP3 precise ephemeris
 - Check User name and Password
 - Baseline fixed condition: GPS satellites fixe
 - Base line Length Limit: 150 km
 - Using single mode when rover is out of net: 50 km
 - Forbidden Satellites (e.g. G32;R03;C05): G32;C05;
 - Time reference station: (empty)
- Map section:
 - Online Map Used: Baidu Map
 - Map Grade: 5
 - Default Center L: 104.0
 - Center B: 36.0
- Database section (highlighted with a red box):
 - Database Type: SQL
 - Database Path: LITING-PC\CRNETDATA Local
 - User Name: sa Password: *****
 - Project Database: EXAP
 - Server Database: HCORS

Buttons: OK, Cancel

CPS configuration – registration

- Registration code for **functionalty**.
- Two registration identification method: **Dongle** and **Machine code**.



The screenshot shows a 'Register' dialog box with the following fields and options:

- Dongle ID:** [Empty text box]
- Machine Code:** [3JV5E4X222]
- Valid Period:** [2000-01-01 ~ 2016-12-31]
- Station Num Limit:** [50]
- Function:** [Network Solution; Position Monitoring; OP;]
- Registration Code:** [Empty text box]

On the right side, there are two radio buttons: Dongle and Machine Code.

At the bottom right, there are three buttons: 'Register', 'Ok', and 'Cancel'.

CPS update

- Any update for CPS, users can directly drag the **configuration** file from old version and drop it into the new version directory in order to **clone** the settings without losing any configuration.
- The configuration file is named as **Setting.config** and it will be found in the root directory of CPS 64-bit.

CPS configuration – add station

- Click **Add Station** button
- Type in **Station Name**, **Code** and **Coordinates**
- Select **Receiver Type**, **Coding Method** and **Antenna Height**
- Type in data transmission **method**

The image displays two screenshots of the 'Station Info' configuration window. The left screenshot shows the 'Basic Information' tab with the following fields:

- Station Name: TEST
- Station Code: TEST
- Data Collect: Elevation Mask: 8
- Receiver: Manufacturer: CHC Navigation, Name: CHC N72
- Antenna: Type: CHCC220GR2

The right screenshot shows the 'Connecting' tab with the following fields:

- Connect Type: TCPClient
- IP: 127.0.0.1
- Data Port: 2101, Diff Port: 0
- WebUI: (empty)

Both screenshots include 'OK' and 'Cancel' buttons at the bottom right.

CPS configuration – build subnet

- Click **Add Subnet** button
- Type in **Subnet Name**, **Service port** and **Station used**
- Select **Service Type**, **System** and **Atmosphere Model**
- Set in **coordinate system info** or **CPCaster** setting for additional using

The image displays four sequential screenshots of the 'Net Property' dialog box, illustrating the configuration steps for building a subnet.

- First Screenshot (Base Information):** Shows the 'Name' field set to 'TEST' and the 'Port' field set to '2102'. The 'Stations Contained' section has an 'All' button and a 'Remain' button.
- Second Screenshot (Coordinate Parameters):** Shows the 'Service Type' set to 'NTRIP', 'System' with 'GPS', 'GLONASS', and 'GLONASS' checked, and 'Atmosphere' with 'Solve Model' set to 'CPSI' and 'NetSolveMethod' set to 'Classical'.
- Third Screenshot (Coordinate Parameters):** Shows a table for adding stations with columns for 'NO.' and 'Name', and 'New' and 'Apply' buttons.
- Fourth Screenshot (CPCaster):** Shows the 'CPCaster' tab with 'Enable CPCaster' and 'Store History File' checked. The 'Connect' section has 'Connect Type' set to 'TCPServer', 'TCP IP' set to '127.0.0.1', and 'Port' set to '3000'. The 'System' section has 'GPS', 'GLONASS', 'BDS', and 'GALILEO' checked.

CPS configuration – start RTK service

- Click **Run – MountPoint Manage**
- Click **Run – User Manage**

MountPoint Option

Name:

Service Type: RTD RTK

System: GPS GLONASS BDS

Coding: Type: MSM
 Content:
 Coordinate Parameter Index of Subnet Server:
 Interval of Sending Data:
 Receiver type for Glonass inter-frequency bias offset:
 Additional Info Ephemeris Data
 Compass Ephemeris Type:

Solution Type: Single Station Virtual Mode Original Diff Data Auxiliary
 Data from all satellites will be sent if user distance is less than km

Master Reference Station:

User Info

User Name:

Alias:

Enable: Yes No

Password:

MountPoint List:

Subnet Server List:

Num Limit:

Start Time:

End Time:

Company:

Telephone:

Thank you!