SDK Ntrip

GNSS Correction Data Delivery Service

User Manual

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Revision History

Version	Date	Description	Remarks
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1 Interface Specifications

1.1 Protocol

1.1.1 Communication Protocol

SDK Ntrip is an NtripCaster that distributes GNSS correction data received from base stations to receivers and software. Correction data helps a receiver determine its position more accurately; a base station transmits the observation data on which corrections are based. Communication uses NTRIP Ver. 1 and Ver. 2.

The communication roles are as follows:

(1) Base station: Sends correction data to SDK Ntrip.
(2) SDK Ntrip: Distributes the correction data it receives.
(3) NtripClient (receiving client): A device or software application that selects a stream and receives correction data.

The base station uses SOURCE with Ver. 1 and POST with Ver. 2. The receiving client uses GET.

1.1.2 Authentication Methods

The base station uses the source credentials configured when the station is registered. For Ver. 1 SOURCE, the source password is checked; for Ver. 2 POST, the source username and password are checked.

The receiving client follows the access setting of each mountpoint.

(1) Fully public: No credentials are required.
(2) Password: The stream's connection password is checked. The username is used to identify the user.
(3) Account name and password: A registered web account name or base-station connection account name, together with the stream's connection password, is checked.
(4) Private: The owner's own web account name and the stream's connection password are checked. A base-station connection account cannot be used.

Basic authentication is used for Ver. 2 source uploads and for client connections requiring authentication. Basic authentication does not itself encrypt communications. Use credentials appropriate to each purpose: web login, base-station uploads, and reception of correction data.

1.1.3 Connection Host and Port Numbers

(1) Connection hostname: Use the actual host provided for your SDK Ntrip environment in place of <connection-hostname>. Do not enter the placeholder literally. Use the same hostname as the management console, without https:// or a page path.
(2) Port numbers: 2101 is for ordinary unencrypted communication; 2102 is for encrypted communication (TLS).
(3) TLS requirements: Enable TLS on a device or software application that supports TLS 1.2 or 1.3. TLS encrypts communications; changing the port number alone does not enable encryption. Enable server-certificate and connection-hostname validation. A client certificate is not required.

The base station and receiving client can each choose ordinary communication or TLS independently. HTTPS access to the management console uses port 443 and is configured separately from NTRIP connections.

1.2 Mountpoints

A mountpoint is the name that specifies which correction stream to receive. SDK Ntrip supports specifying a stream individually or using /AUTO to select the nearest available base station based on the receiving client's current position.

(1) Individually Specified Mountpoints

Enter the desired stream name in the receiving client's connection settings. The following names are illustrative only; they are not registered streams.

STATION	Example stream from a registered base station.
STATION_MSM4	Example MSM4-converted stream from the same base station.
STATION_GPS_QZSS	Example GPS/QZSS stream from the same base station.

In practice, specify a mountpoint registered by its owner. For example, enter STATION as the name on the registration screen; the path used in communication is /STATION. Follow your device or software instructions on whether to enter the leading /.

(a) Naming Rules

The name portion must be 1–64 characters long. ASCII letters and digits, periods (.), underscores (_), and hyphens (-) are allowed; the first character must be a letter or digit. Names are case-insensitive and must be unique across the service. AUTO is reserved for automatic selection. Changing a name after registration requires deletion and re-registration.

(b) Base-Station Upload Mountpoint

The base station connects to the source mountpoint configured at registration. Across ports 2101 and 2102, only one source connection is allowed for a given base station. Uploads to cloned streams are not accepted.

(c) Multiple Streams from One Base Station

Use "Clone Mountpoint" in the management console to add streams that share the same base-station input. Configure the satellite constellations, MSM output, access setting, and receiving-client connection password separately for each stream. Each stream processes the original, unconverted input independently.

The base-station name, receiver, antenna, source credentials, and coordinates are shared by all streams from that base station. A clone does not inherit the connection password: set one for any new stream that requires protection. Source and receiving-client connection passwords must each be 10–256 characters long.

(d) Stream List (Source Table)

A Source Table lists the mountpoints a receiving client can retrieve with a GET request to the root path /. It includes enabled streams but excludes private streams. A stream may be listed while its source is offline, so listing alone does not confirm active delivery.

(2) Nearest-Station Auto-Selection Mountpoint

When the client connects to /AUTO, the nearest station is chosen from the representative mountpoints of available base stations using the client's current position.

(a) Sending the Current Position

The receiving client must send an NMEA-0183 GGA sentence. GGA is the data by which the client reports its current position. GPGGA, GNGGA, and other GGA sentences can be used.

Send the initial position in the Ntrip-GGA header of the connection request or as a GGA line following the GET request. The initial wait for GGA is up to 10 seconds. A GGA sentence cannot be used if its fix quality is 0 or missing, or its coordinates are out of range. If a checksum is included, it must be a valid two-digit value.

Continue sending GGA periodically over the same connection. An interval of 1–10 seconds is recommended, with CRLF line endings. An initial header alone does not update the client's position after it moves.

(b) Base-Station Selection Criteria

A candidate must be the designated representative mountpoint of a base station, be enabled, have a connected source delivering valid RTCM, and have verifiable coordinates and access permissions. Coordinates obtained from the live RTCM are preferred; if unavailable, the registered latitude and longitude are used.

Password-protected streams may also be candidates. The single set of Basic credentials sent when connecting to /AUTO is used to authenticate against each candidate. Automatic selection does not waive authentication requirements.

Designate one representative mountpoint per base station with the crown button in the management console. If that representative is offline or authentication fails, another stream from the same base station is not substituted automatically.

(c) Reselection and Switching After Connection

After initial selection, the service searches again every 10 minutes using the latest position. If a closer station is available, it switches sources while maintaining the client connection. If distances are equal, the current station is retained. Switching does not occur immediately after movement.

If more than 30 seconds have passed since the last valid GGA, or an invalid GGA is received, reselection and switching pause until the next valid GGA. Delivery from the current station continues meanwhile. When valid GGA resumes, an overdue search runs at that time.

When switching, previously obtained base-station information from the new station is sent before its observation data. Changes to the representative mountpoint or connection conditions take effect immediately for new connections and are evaluated at the next search for an existing AUTO connection.

(d) Connection Termination and Reconnection

If the source disconnects or the active stream is disabled or deleted, the client connection ends as well. Configure the receiving client to reconnect. The connection also ends if no available candidate is found during reselection.

Automatic selection has no maximum connection distance. It selects a nearby station among those available; it does not select based on positioning accuracy. Positioning status during a switch depends on the receiver and operating environment.

1.3 Data Format and Message Types

SDK Ntrip processes and distributes RTCM 3 data received from base stations. RTCM is a format for transmitting and receiving correction data. The actual messages present depend on the base-station receiver and its transmission settings.

(1) Satellite Observation Data

MSM is a format for satellite observation data in RTCM. The following message-number families correspond to the supported satellite constellations:

GPS	107x
GLONASS	108x
Galileo	109x
SBAS	110x
QZSS	111x
BeiDou	112x
NavIC	113x

The final x indicates the MSM type. For example, GPS MSM5 is 1075 and GPS MSM4 is 1074. The service does not create constellations or observation information absent from the input.

(2) Base-Station Information

RTCM messages 1005 and 1006 relate to base-station position; 1007, 1008, and 1033 relate to antenna and receiver information. SDK Ntrip handles messages transmitted by the base station. When position is extracted, coordinates in 1005 or 1006 are converted to WGS84 latitude, longitude, and ellipsoidal height.

(3) Per-Stream Constellation and MSM Output

Selecting satellite constellations removes known observation and navigation messages belonging to unselected constellations. Messages not classified by constellation pass through.

For MSM output, choose “Preserve input” or “Convert MSM5/6/7 to MSM4.” Conversion adapts data to a format the receiver can handle. MSM1–4 are preserved, while MSM5–7 are converted to MSM4 representation. Information not present in MSM4 is omitted, and the precision of some values changes.

To retain the original constellation and MSM formats, select all constellations and “Preserve input.” Even then, a CRC check detects corrupted data; invalid frames and data outside RTCM frames are not distributed.

1.4 Data Transmission Interval

The correction-data transmission interval depends on the interval of data sent by the base station and the stream settings. SDK Ntrip does not generate all observation data anew at a fixed interval. Check the base-station transmission settings for the intervals of GNSS observations and base-station information. The GGA reporting interval for AUTO and its 10-minute reselection interval concern station selection, not the correction-data transmission interval.

1.5 Supported GNSS Signals

SDK Ntrip can be configured for GPS, GLONASS, Galileo, QZSS, BeiDou, NavIC, and SBAS. GNSS is the collective term for these satellite navigation systems.
The signals delivered depend on those observed by the base-station receiver and included in its RTCM input, together with the stream's constellation and MSM output settings. Not every base station supplies data for every constellation or frequency band.
Check the constellations, signals, and RTCM messages supported by your receiver before choosing a stream. Signals present in the input can be checked in the management console's base-station information. Converting to MSM4 does not add signals or observations absent from the input.

1.6 Additional Information

(1) Getting Started and the Management Console
From the public website at https://sdk-ntrip.com/, open the management console and sign in with a web account. If the Terms of Use confirmation screen appears, review the terms and indicate your agreement. To publish a base station, register the station and its stream settings, then send correction data to the source destination configured at registration.

(2) Accounts and Credentials
The "Base-Station Connection Account" in the management console identifies and authenticates NTRIP connections that receive correction data. It differs from a web login and the source username used to upload data from a base station. It cannot be used for private streams.

(3) Changes, Deactivation, and Deletion
Changes to constellation selection and MSM output also apply to connected receiving clients. Changes to source credentials take effect on the next source connection. Individually specified client connections are not reauthenticated when access settings or connection passwords change. AUTO checks connection conditions at reselection.
Disabling or deleting a stream ends its receiving-client connections. If the source disconnects, receiving-client connections to all streams from that base station end. Deleting the base station itself removes the input, all streams, and associated history.

(4) Operating Status and Notifications
The management console shows a base station's reception status, position, satellite information, connection history, and data usage. Notification emails go to destinations registered on the account; none are sent if no destination is registered. This setting is separate from a stream's public contact information.

(5) Receiver Setup and Terms of Use
For device-specific instructions, consult the receiver or software manual. Configure the connection host, port, TLS setting, mountpoint, and credentials for the chosen stream. Even if the connection succeeds, confirm on the receiver that the necessary correction data is arriving and check its positioning status.
Consult the published Terms of Use for the conditions governing SDK Ntrip.
Terms of Use: https://sdk-ntrip.com/ja/eula/

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