R·sensors

MULTIFUNCTIONAL PROGRAMMABLE MODULE NDAS-RT

Typical Solutions

version 1.0

1. Stationary seismic observation point

It is assumed there is a wired Ethernet connection and a power supply at an observation site. A low-noise digital molecular-electronic seismometer of the CME-4x11ND / CME-6x11ND series is used to observe remote seismic events. To observe the nearby seismics, a digital seismic molecular-electronic accelerometer MTSS-10x3A-ND is used.

Seismic sensors are powered from the NDAS-RT module's USB ports. The maximum distance from the module to the sensors is 5 meters. External GPS antennas connected to the sensors are used to synchronize the instruments (not shown at the figure).

The real-time data is transferred using the SeedLink protocol. If the data is saved to an SD card, the saved data can be read using the SeedLink or FTP protocols.

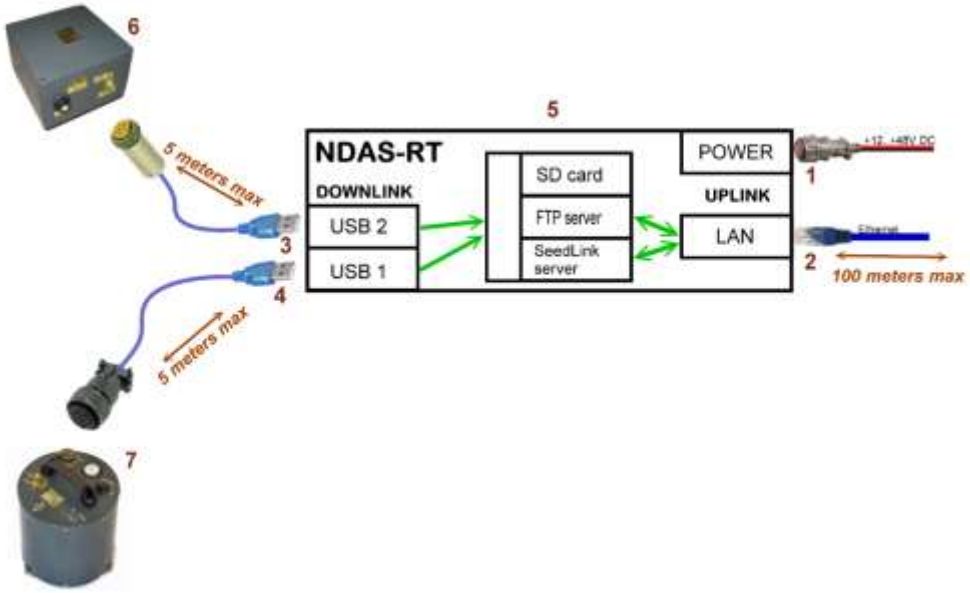


Fig. 1. Organization of a stationary seismic observation point

The numbers at the figure indicate:

1 – Power connection of NDAS-RT module
2 – Ethernet connection
3, 4 – Connection of digital signal seismic sensors
5 – NDAS-RT module
6 – Digital accelerometer
7 – Digital seismometer

2. Mobile / remote seismic observation point

It is assumed that there is a mobile coverage of the 3G standard and above and a power supply at the observation site. A low-noise digital molecular-electronic seismometer of CME-4x11ND / CME-6x11ND series is used to observe remote seismic events. To observe the nearby seismics, a digital seismic molecular-electronic accelerometer MTSS-10x3A-ND is used.

Seismic sensors are powered from the module's USB ports. The maximum distance from the module to the sensors is 5 meters. External GPS antennas connected to the sensors are used to synchronize the instruments (not shown at the figure).

The real-time data is transferred using the SeedLink protocol. If the data is saved to an SD card, the saved data can be read using the SeedLink or FTP protocols.

Depending on the signal strength of the mobile network, both antennas installed on the module's housing and remote antennas having a 15-meter cable can be used.

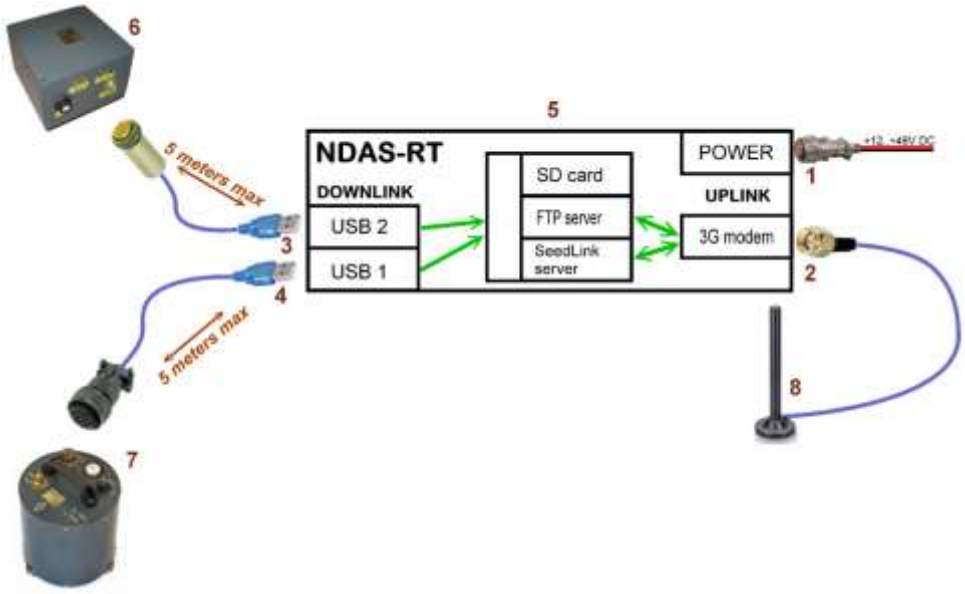


Fig. 2. Organization of a mobile / remote seismic observation point

The numbers at the figure indicate:

1 – Power connection of NDAS-RT module
2 – 3G/LTE antenna connection
3, 4 – Connection of digital signal seismic sensors
5 – NDAS-RT module
6 – Digital accelerometer
7 – Digital seismometer
8 – 3G/LTE antenna

3. Stationary point at remote installation of digital seismic receivers using RS-485 interface

It is assumed that there is a wired Ethernet connection and a power supply at the observation site. A low-noise digital molecular-electronic seismometer of the CME-4x11ND series or an accelerometer of MTSS-10x3A-ND series is used for observation.

The receiver is powered from the RS-485 port of the module. The maximum distance from the module to the sensor is 500 meters. An external GPS antenna connected to the module is used to synchronize the instruments. The data from the seismic receiver is acquired through the RS-485 protocol.

In addition to the seismic receiver connected via the RS-485 interface, additional seismic receivers can be connected to the module using a USB connection similar to option 1 (not shown at the figure).

The real-time data is transferred using the SeedLink protocol. If the data is saved to an SD card, the saved data can be read using the SeedLink or FTP protocols.

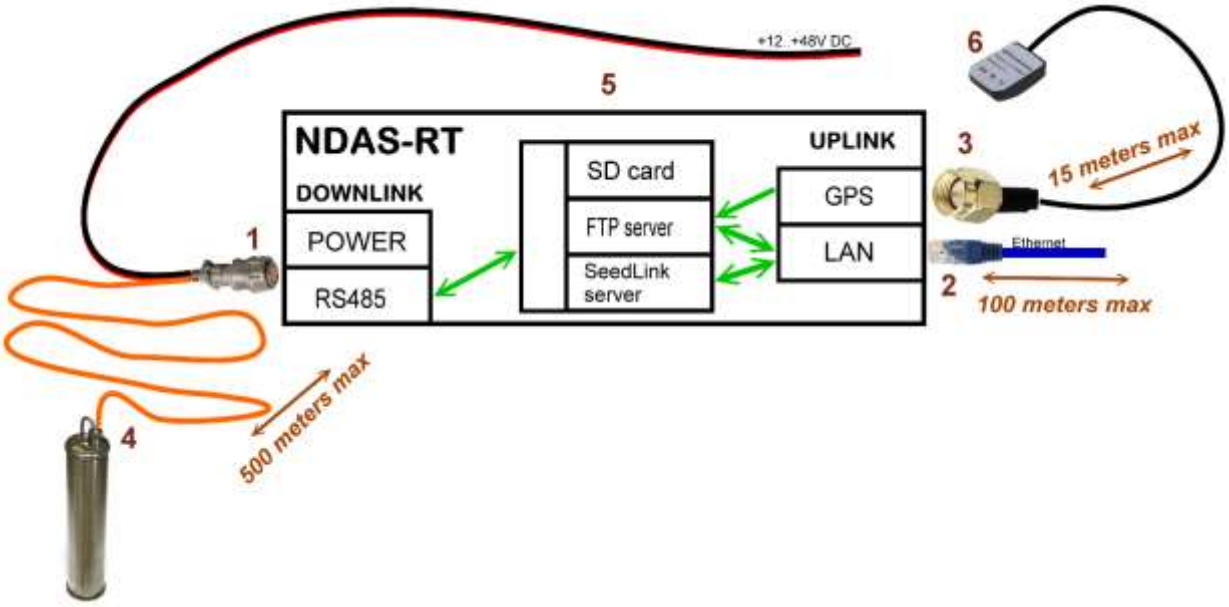


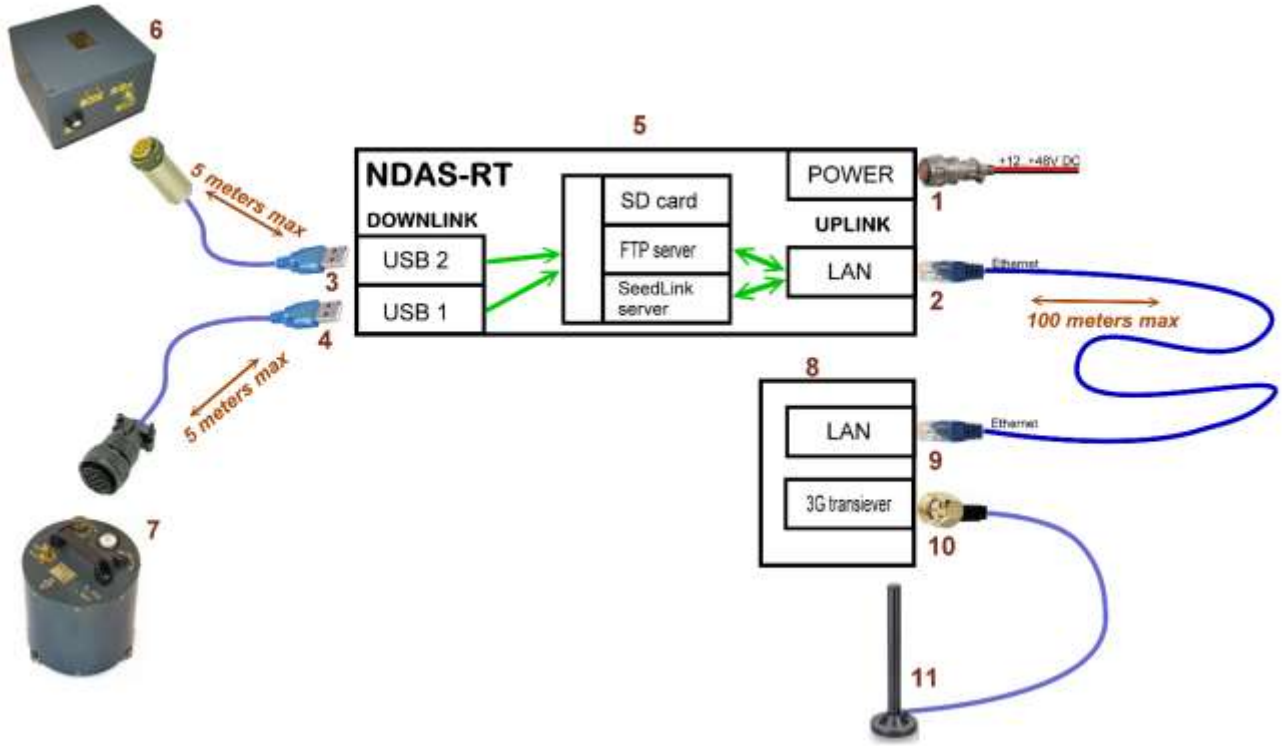
Fig. 3. Organization of a stationary point at remote installation of seismic receivers

The numbers at the figure indicate:

1 – Power connection of NDAS-RT module / Connection of remote seismic receivers
2 – Ethernet connection
3 – GPS antenna connection
4 – Digital seismometer / accelerometer
5 – NDAS-RT module
6 – GPS antenna

4. Mobile / remote point of seismic coverage at weak 3G coverage areas

If there is a 3G signal of the insufficient power network at the module's location, an external 3G transmitter with a remote directional antenna can be used to improve communication.



Puc. 4. Organization of a stationary observation point at weak 3G coverage areas

The numbers at the figure indicate:

1 – Power connection of NDAS-RT module
2, 9 – Ethernet connection
3, 4 – Connection of digital signal seismic sensors
5 – NDAS-RT module
6 – Digital accelerometer
7 – Digital seismometer
8 – 3G modem / Ethernet router
10 – 3G/LTE antenna connection
11 – External 3G/LTE antenna

5. Stationary seismic observation point using analog sensors

Organization of a seismic observation point means using seismic receivers with analog outputs, including third-party production, but digitizing of the analog signal without loss of quality requires using a 24-bit analog-to-digital data logger NDAS-8226. The sensors are connected to the ADC inputs and the acquired data is transmitted to the module via USB.

Seismic sensors are powered from the data logger, the distance from the module to the data logger is up to 5 meters, the distance from the data logger to the sensors is up to 200 m (if seismic receivers with a differential output are used). An external GPS antenna connected to the data logger is used to synchronize the instruments.

The real-time data is transferred using the SeedLink protocol. If the data is saved to an SD card, the saved data can be read using the SeedLink or FTP protocols.

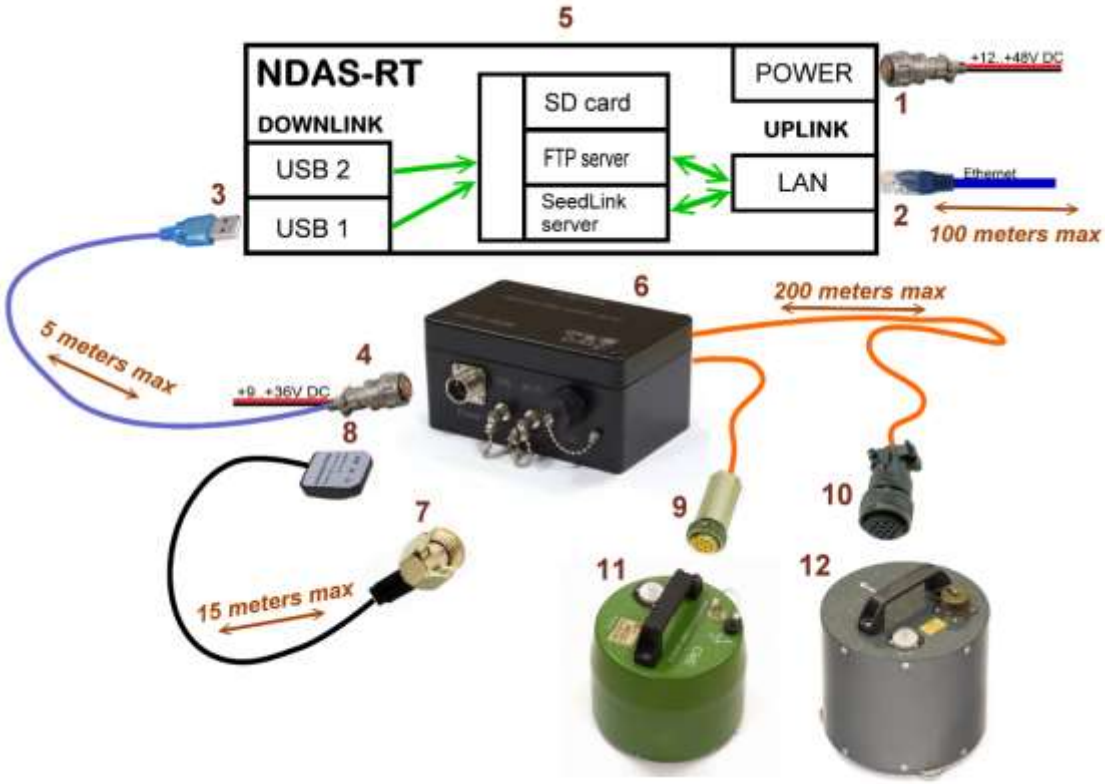


Fig. 5. Organization of a stationary observation point using analog sensors

The numbers at the figure indicate:

1 – Power connection of NDAS-RT module
2 – Ethernet connection
4 – Connection of NDAS-8226 data logger (power and communication)
5 – NDAS-RT module
6 – NDAS-8226 24-bit data logger
7 – Connection of GPS antenna to NDAS-8226 data logger
8 – GPS antenna
9, 10 – Connection of analog seismic receivers
11, 12 – Analog seismic receivers of CME series