White Whale Satellite IoT System

IoT Data Transmission via Satellite

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Demands for Data Transmission of Satellite IoT

Data transmission capability is a key link in the successful application of IoT, for masses of data, which are generated by great number of sensors along with the widened applications of IoT, must be transmitted to the business center for centralized treatment due to the restricted computing and storage capability of sensor. In areas with advanced communication infrastructure, the IoT data can be transmitted via wired and 4G network; however, satellite IoT becomes the only choice for IoT data transmission in remote areas without any communication infrastructure, such as sea, desert and forest.

IoT data transmission of oil-gas well

The data generated by oil-gas well are constantly collected and disposed by business center in the modern production process of oil and gas. The data generated by oil-gas well can be timely transferred to the business center through satellite communication, for the oil-gas wells are generally located in remote areas, such as sea and desert, and lack of other communication methods.

IoT data transmission of mine industry

The application of IoT in mine industry greatly improves the automatic level of mineral mining, saves the cost and improves safety, and data transmission is an important link in the application. Featured by large coverage and unrestricted geographical conditions, satellite communication offers convenient channels for transmission of IoT data in great number of remote mine areas.

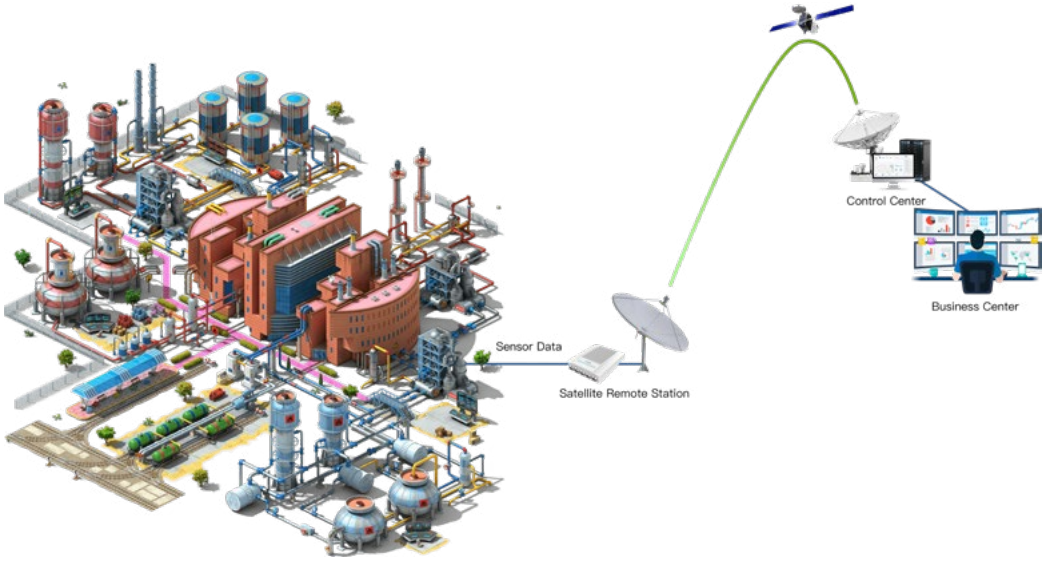
IoT data transmission of forestry industry

Great amount of sensor data will be transferred in IoT of forestry industry, for it mainly applies to forestry resource management, forestry disaster monitoring and forestry ecological monitoring. Satellite communication is a data transmission solution with the highest cost performance, for forestry resources are generally located in untraversed area where communication infrastructure can be hardly established.

IoT data transmission of oceangoing freighter

By conducting real-time acquisition and centralized treatment of cargo status, the operation company of oceangoing freighter can improve the transport efficiency greatly, for oceangoing freighter can carry great number of cargos. Satellite communication is the sole contact method for oceangoing freighter and status data can be transmitted to the business center through satellite signal only.

Solution of IoT Data Transmission



IoT data transmission via satellite

IoT data transmission via satellite becomes the sole solution in the fields, such as oil and gas, mine industry, forestry industry and ocean transportation, for IoT data fail to be transmitted through the traditional communication network, such as optical fiber and 4G network, due to the poor communication infrastructure.

As a satellite data transmission system that is specially designed for the IoT application, the white whale satellite IoT system (hereinafter referred to as “the System”), is provided with TDMA technical system and specific communication protocol, supports masses of terminals and utilizes satellite resources efficiently, to greatly reduce the cost of device and satellite bandwidth. The System can be divided into multiple data subnets; the satellite terminal of each data subnet shares one business channel; the satellite network manager may have dynamic distribution of communication time slot based on the business demands, while the satellite terminal may send the business data based on timeslot plan, in order to transfer the business data to the business center within the specified interval. Being powered by solar energy and maintenance-free, the satellite terminal can enter all-weather operation immediately after installation, to solve the IoT data transmission of remote areas completely.

Satellite remote station

Being composed of Type WWT200A satellite terminal, small-aperture satellite antenna and solar panel, the satellite remote station is fitted with RJ45, RS232, RS422/485 interfaces to connect all IoT systems. With external connection to small-aperture satellite antenna, the satellite terminal is managed and controlled by the control center, and sends the IoT data to the business center through the satellite signal channels distributed by control center.

Control center

The white whale IoT system control center manages and controls the satellite terminals in network, distributes satellite signal channel and communication timeslot for remote stations, receives the IoT data from remote station and then transfers it to the business center.

Business center

As a department of user for monitoring and disposing IoT data, the business center can receive the IoT data from satellite communication control center in the satellite IoT application system, to analyze and handle such data.

Typical Applications

IoT data transmission of oil-gas well

The application of IoT technique brings high automation level, lower cost and higher safety and reliability to oil & gas exploitation, which is an industry requiring high-standard technique and safety. The System must have stable and reliable transmission channel to ensure timely analysis and treatment of data, for the process of oil & gas exploitation depends on collection, transmission and disposal of mass sensor data. However, efficient transmission of IoT data becomes a key problem requiring a solution, for oil-gas wells are generally located in areas such as sea and desert and lack of some necessary communication facilities.

Featured by wide coverage and easy deployment, satellite communication is an ideal solution for IoT data transmission of oil-gas well. The satellite terminal station, which consists of satellite IoT terminal and small-aperture antenna, can be easily installed near the oil-gas station, to provide satellite channels for IoT data transmission. Fitted with multiple data interfaces, such as RJ45, RS232, RS422/485, the satellite terminal has no restriction on format of transmitted data and enjoys good adaption to all types of IoT applications. The small-aperture satellite antenna, which is connected to the satellite IoT terminal, enjoys simple structure and easy installation, and it can have outdoor all-weather operation for 7 × 24h immediately after outdoor fixing.

Satellite IoT terminal

Type WWT200A satellite IoT terminal offers IoT data transmission services for user, receives IoT data generated by sensor through data interface, and then sends the data to business center through the satellite channel. The satellite IoT terminal, which is connected to the small-aperture satellite antenna through RF cable, is managed and controlled by the control center through satellite antenna, and establishes data transmission channel with the business center.

Small-aperture satellite antenna

The small-aperture satellite antenna, which is installed outdoors for receiving and sending satellite signals, enjoys simple and reliable structure to ensure easy installation and stand up to the severe outdoor environment. The antenna sends the satellite signals to the satellite router through the RF cable, and then converts the data into wireless signals and send them out through the satellite router.

Solar panel

Due to difficult power guarantee and low power of satellite IoT terminal in field environment, the solar panels can be installed easily to satisfy the power demands and avoid additional power supply.

Merits

Satellite IoT system which applies to IoT data transmission

As a satellite communication system which applies to IoT data transmission, the System enjoys proprietary intellectual property rights, follows TDMA technical system and specific communication protocol, to support networking of masses terminals and use satellite resources efficiently, in order to reduce the cost of satellite bandwidth greatly. As the first satellite IoT system within Ku frequency band in China, the System can directly use the Ku frequency band communication satellite with rich resources without reliance on the specific constellation system, to ensure excellent university.

White whale satellite IoT system	Other satellite IoT systems
• **The first satellite IoT system within Ku frequency band in China**	• No similar products within this frequency band yet in China
• **Specific design of IoT application, high utilization rate of bandwidth**	• Not fully optimized for IoT application
• **Large-scale network management, million-level terminal**	• Restricted network scale, fail to support masses of terminals
• **Flexible configuration of sub-nets, satisfying different rates**	• Fixed configuration, failing to satisfy different rates
• **Proprietary intellectual property rights, high customization**	• No core technique, difficult customization

Technical Parameters

Network management system	
• Quantity of terminals supported	⩾1 million
• Transmission system	Specially optimized TDMA communication system for IoT
• Real-time status display	Real-display of information, such as work status of system terminals, amount of sent/received data and resource utilization rate
• Event management	Centralized display of events in system, including networking, network quit and network management.
• IoT terminal configuration	Support configuration of IoT terminal and master station terminal through graphic mode.
• Configuration of central station	Support configuration of antenna and terminal in central station through graphic mode.
• Topology management	Display information of terminal status on E-map and support network quit.
• Configuration of satellite resources	Support configuration of parameters, such as satellite, wave number, repeater and frequency of data sub-net, through graphic mode.
• Configuration of data subnet	Support configuration of multiple data subnets and each data subnet is configured with specific satellite resources.
• Dynamic distribution of business timeslot	Distribute the communication timeslot of IoT terminal based on business rate demands.
• Terminal communication control	Support data transmission termination and network quit of terminal.
• Data query and statistics	Support query and statistics of operation data by condition of time, terminal and data subnet.
• Fault alarm	Support fault alarm of terminal device in master station and highlight it in user’s interface
• Performance alarm	Conduct regular statistics of system utilization rate and give out alarm when exceeding the threshold
• System authority control	Provide user-based access control, assign different operation authorities to administrator and common user
• Internationalization support	Support multiple languages on user interface and one-key switching of interface language.
• Remote management	Control center software is based on B/S architecture and supports remote operation of administrator via network.
• System hot backup	Both system service progress and database support local/remote 1:N hot backup
• Unattended operation	Enter auto running after system configuration without any manual interference, support 7×24h operation.

Technical Parameters

Central station terminal	
• System	TDM/TDMA
• Antenna Frequency Range	Forward: 14.0GHz ~ 14.5GHz; Return: 12.25GHz ~ 12.75GHz
• Modulation	QPSK
• FEC	LDPC (1/2)
• Number of forward channel	16
• Data Rate of forward channel	64 kbps
• Number of return channel	16
• Data Rate of return channel	64bps~56kbps
• User Supported	Each forward channel supports ＞2000 users Each return channel supports ≤1024 users
• Work Frequency	L Band: 950 to 2150 MHz , 100 Hz step
• Roll-off	35%
• Threshold Eb/N0	2.5 dB
• Weight	10kg
• Dimensions	4U
• Power Supply	100 to 240 VAC, 50-60 Hz
• Power Consumption	≤300W
• Data Interface	RJ45, RS232/RS485
• Control Interface	RJ45
• Connector	75 ohm Type N female

Technical Parameters

Remote terminal	
• System	TDM/TDMA
• Data Rate	64bps ~ 12Kbps
• Antenna Frequency Range	Forward: 14.0GHz ~ 14.5GHz; Return: 12.25GHz ~ 12.75GHz
• Modulation	QPSK
• FEC	LDPC (1/2)
• Channel Number	1 forward/return channel respectively
• User Supported	≤1024 users
• Roll-off	35%
• Threshold Eb/N0	2.5 dB
• Power Supply	24V
• Power Consumption	≤20W
• Data Interface	RJ45, RS232/RS485
• Control Interface	RJ45
• Connector	50 ohm Type SMA female

Company Profile

Mission: Stay connected anytime, anywhere

Prospect: Become the most trusted and professional satellite communication enterprise

Founded in June 2017 as a hi-tech enterprise engaged in R&D, manufacturing and servicing of satellite communication, Cowave has 150 staffs, occupies an area up to 2,447 m2, been awarded with “National hi-tech enterprise”, “Jiangsu private technique enterprise” and “Nanjing innovative leadership enterprise”, passed the authentication of ISO9001 quality management, environment management, information technique service management and after-sales service evaluation 5A system, owned the professional certificates of 3A credit and trustworthy and dozens of core technical patents. Cowave can offer fully homemade satellite communication systems, including portable satellite communication terminals, vehicle-mounted satellite communication terminals, shipborne satellite communication terminal, airborne satellite communication terminal and satellite communication network management software. Compared with the overseas systems, the systems of Cowave enjoy obvious merits in information security, customization and service guarantee and the products are widely applied in the fields, such as emergency, education, media and internet.

COWAVE

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