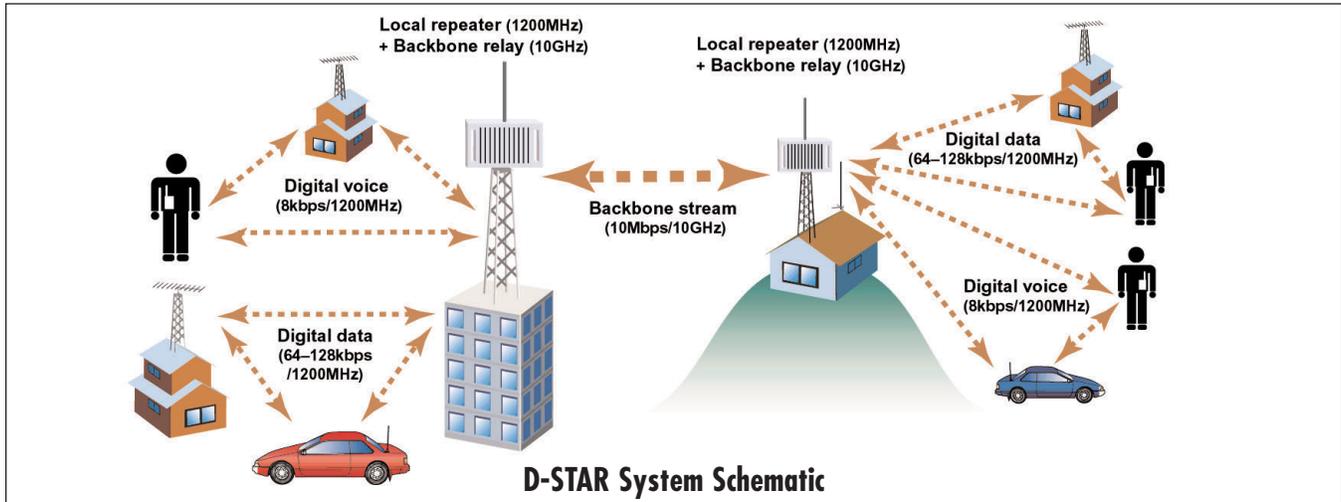


D-STAR SYSTEM



ICOM introduces the next generation digital amateur radio system – the D-STAR system. The D-STAR system provides digitally modulated voice/data communication and high-speed data access over the air. This project has been developed in collaboration with JARL (Japan Amateur Radio League) and is supported by the Japanese Telecommunications Administration. ICOM has begun field tests on D-STAR.

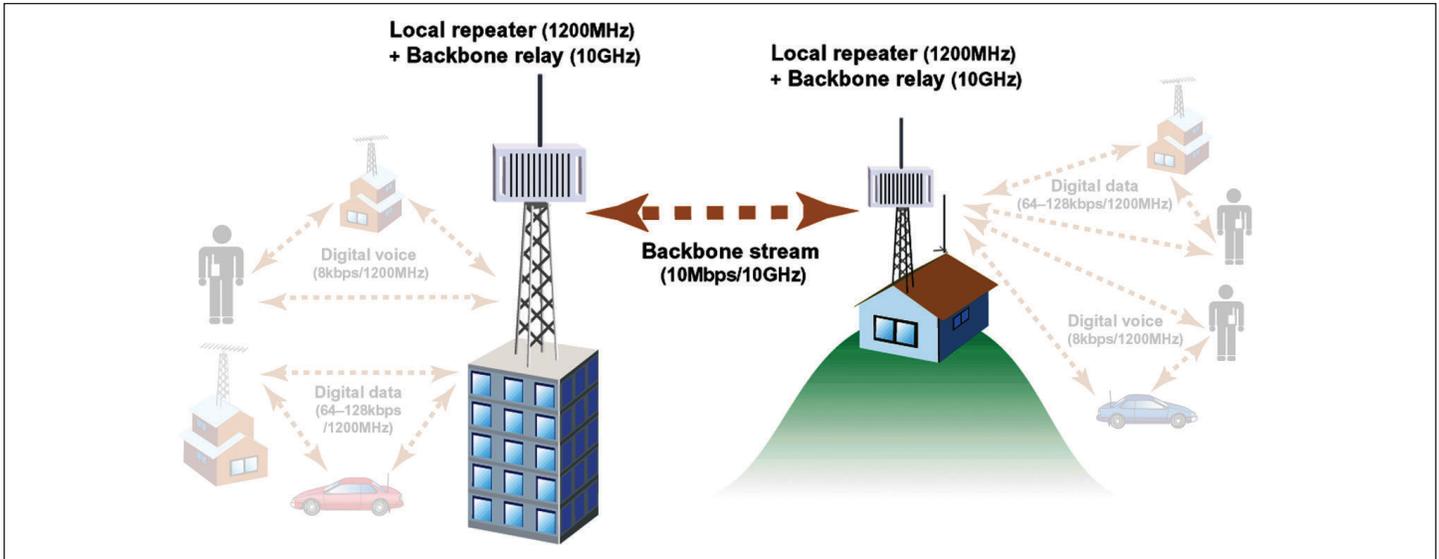
Fundamental Plan of the D-STAR System

The D-STAR system brings the advantages of high-speed digital modulation to Amateur Radio. All of the transmissions including voice and pictures are digitally encoded. Digitally modulated voice is transmitted at 8 kbps and digital data is transmitted at 128 kbps (max.) from terminal to terminal or to a repeater. Repeaters can be linked up with a 10 Mbps backbone in the 10 GHz band, providing a multi-site repeater system. The transceiver can have an Ethernet cable port, which provides direct connection to a PC, router, hub or other network devices. The resulting system seamlessly transmits high-speed IP compliant data and digital voice. Amateur radio operators now have a system that will allow them to explore the benefits of wireless high-speed integrated digital connections. Potential applications are only limited by your imagination, but certainly emergency services and amateur Digital TV quickly come to mind.

Features of the D-STAR System

- Digitally-modulated voice and data communication
- High-speed 64–128 kbps data access
- Complies with IP connection
- Repeaters can handle both digital and analog voice
- System operates on multi-site and backbone connection

D-STAR FEATURES



Versatility and expansion of the system is achieved through local repeaters and backbone relays.

DIGITAL REPEATER

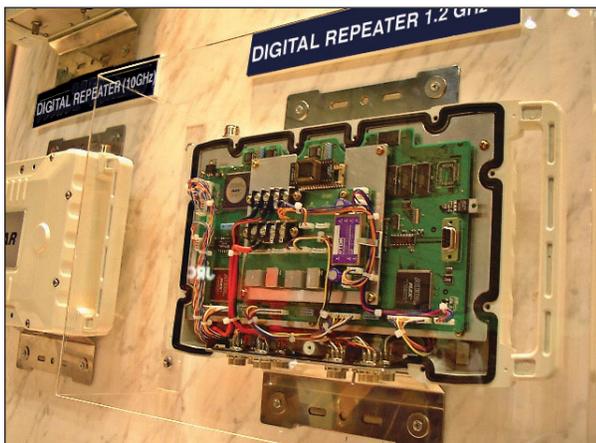
Because the digital repeater is indispensable for the practical use of a digital transceiver, ICOM has also developed a digital repeater for the D-STAR system.

The features of the digital repeater:

- Full-duplex voice service (20 MHz shift)
- Time division multiplexing on data mode
- Repeater handles analog (FM) voice and switches over to digitally modulated voice, and vice versa when necessary
- Multi-site repeater system with 10 Mbps backbone in the 10 GHz band
- Repeater accepts 10Base-T Ethernet cable connection
 - Remote control capability from PC over a network
 - Gateway function from the air to a wired network

Application example:

- 128 kbps Internet access
- Digital Voice Mobile to traditional Analog FM HT Connection
- Nation-wide high-speed backbone system
- Amateur Digital TV



ICOM's digital repeaters, 10 GHz and 1.2 GHz.



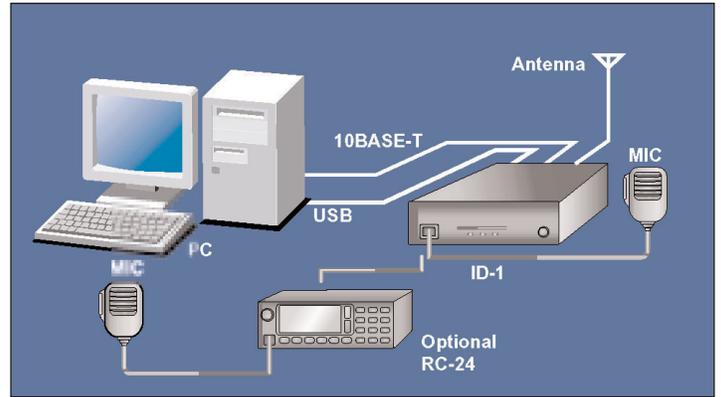
ICOM's Microwave Backbone Digital Repeaters (10 GHz, 1.2 GHz) and Parabolic Antenna

ID-1 FEATURES & SPECIFICATIONS

ID-1 DIGITAL TRANSCEIVER A NEW WAY TO COMMUNICATE

Features

The ID-1 is a digital transceiver, based on the JARL D-STAR standard for digital amateur radio in Japan. Digitally-modulated voice mode (8 kbps, GMSK), high-speed digital data communication (128 kbps, GMSK) as well as analog voice mode communication (FM) are possible. By connecting the ID-1 to a PC with a USB cable and 10BASE-T Ethernet cable, full operation can be carried out by the PC. Also, wireless Internet access can be made easily over the air. And with the optional remote controller, standard voice operation is possible.

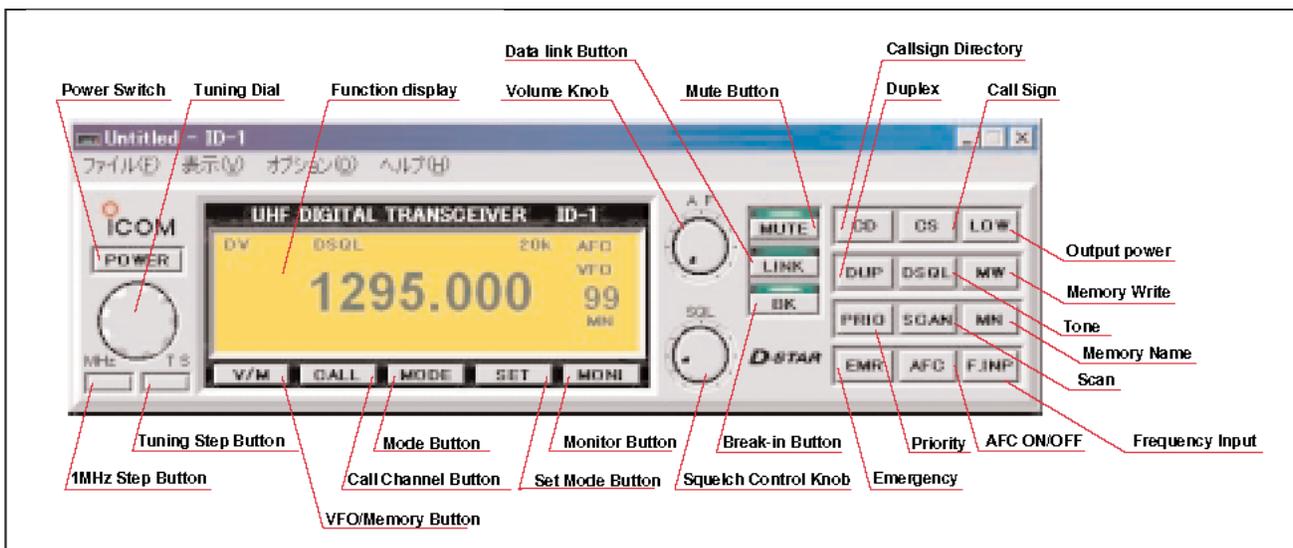


Schematic with ID-1, the optional RC-24, PC, Mic and the USB connection

Specifications

■ Frequency:	1200 MHz Amateur radio band	■ Output Power:	10W/1W	
■ Mode:	FM (Analog voice), GMSK (Digitally modulated voice/data)	■ Sensitivity:	FM	0.16μV
■ Data rate:	8 kbps (Voice), 128 kbps (Data)		8 kbps GMSK voice	0.32μV
■ Codec:	G723.1		128 kbps GMSK data	1.3μV
■ Data Interface:	IEEE802.3 (10Base-T) IP Compliant	■ Switching Time:	10 ms (Digital mode)	
■ Control Interface:	USB	■ GMSK Modulation:	Quadrature Modulator	

Controller View Of The PC Display



SPECIFICATIONS

JARL D-STAR SPECIFICATIONS

- Frequency

Utilizes amateur radio bands, in which modulation and bandwidth in both audio and data modes are allowed. The backbone relay between repeaters utilizes 5.6 GHz band or higher, to obtain the required bandwidth.

- Output Power

Within the maximum output power that is allowed for an amateur radio station.

- Transmission Speed And Bandwidth

Mode	Transmission speed	Bandwidth
Voice	8 kbps or less	Less than 9 kHz
Data	128 kbps or less	Less than 130 kHz
Relay	10 Mbps or less	Less than 10.5 MHz

- Carrier Frequency

Mode	Transmission Speed	Frequency Spacing
Voice	8 kbps	20 kHz
	2.4 kbps	10 kHz
Data	128 kbps	160 kHz

- Transmitter-receiver Spacing

Off-set frequency of digital repeater is same as analog FM repeater
Data communication utilizes simplex mode.

These specifications are subject to change without notice. Featured technology is only available in Japan. This system has not been approved in other countries. This device may not be sold or leased, or offered for sale or lease, until approval has been obtained in each country. What has been presented in this brochure are concepts that are being developed.

- Voice Codec

Codec	Conversion Speed
ITU G723.1	5.3 kbps
AMBE	2.4 kbps

- Modulation (Digital Mode)

Mode	Modulation
Voice	GMSK
Data	GMSK
Relay	GMSK

- Multiplex

Asynchronous Transfer Mode (ATM) and another efficient mode are under consideration as the backbone relay.

- Transmitter-receiver Switching

Terminal

	Simplex	Manual & auto switching
Voice		
Data	Simplex	Automatic switching by packet

Relay

	Simplex	Automatic switching
Voice relay		
Data relay	Simplex	Automatic switching by packet
Relay between repeaters	Duplex	Full duplex

This device has not been authorized as required by the rules of the Federal Communications Commission. This device is not and may not be offered for sale or lease or sold or leased until authorization is obtained.

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