

ICS Repeater

RPT869 (GSM 900MHz) / RPT889 (GSM 1800MHz) / RPT899 (GSM 1900MHz)
 RPT919 (CDMA 450MHz) / RPT939 (CDMA 800MHz) / RPT999 (CDMA 1900MHz)
 RPT659 (WCDMA)

The ICS Repeater (Interference Cancellation System) is a new kind of single-band RF repeater that can automatically detect and cancel the interference signals caused by oscillation of RF feedback between the Donor and Coverage Antennas in real time by adopting DSP (Digital Signal Processing) technology. It can continuously and stably cancel the interference signals and be adapted to any changes in the surrounding RF environment (including fixed and mobile objects).

Like the RF repeater, the ICS Repeater is working as a relay between the BTS and mobiles. It picks up the signal from the BTS via the Donor Antenna, linearly amplifies the signal and then retransmits it via the Coverage Antenna (or the Indoor Signal Distribution System) to the weak/blind coverage area. And the mobile signal is also amplified and retransmitted to the BTS via the opposite direction.



As per operator's requirement for working frequency, two types of ICS Repeater are available:

- **Band-Selective ICS Repeater:** to amplify all signals in the whole band (bandwidth is customized);
- **Channel-Selective ICS Repeater:** to amplify only the signals transmitted in the customized channels.

FEATURES

- Aluminum-alloy casing has high resistance to dust, water and corroding;
- Real-time cancellation of interference signal (incl. multi-path fading, feedback signal);
- ICS function to prevent self-oscillation, enhance gain and coverage range, and reduce isolation requirement between donor antenna and coverage antenna;
- Highly selective digital channel selector can process 12 channels simultaneously;
- No interference to BTS by adopting linear amplifier with high gain and low noise;
- Adopting filter with highly selectivity and low insertion loss eliminates interference between uplink and downlink;
- RS-232 ports provide links to a notebook for local supervision and to the built-in wireless modem to communicate with the NMS (Network Management System) that can remotely supervise repeater's working status and download operational parameters to the repeater.

APPLICATIONS

To expand signal coverage or fill signal blind area where signal is weak or unavailable.

- Outdoor: Airports, tourism regions, golf courses, tunnels, factories, mining districts, villages, highways...
- Indoor: Hotels, exhibition centers, basements, shopping malls, offices, parking lots, ...

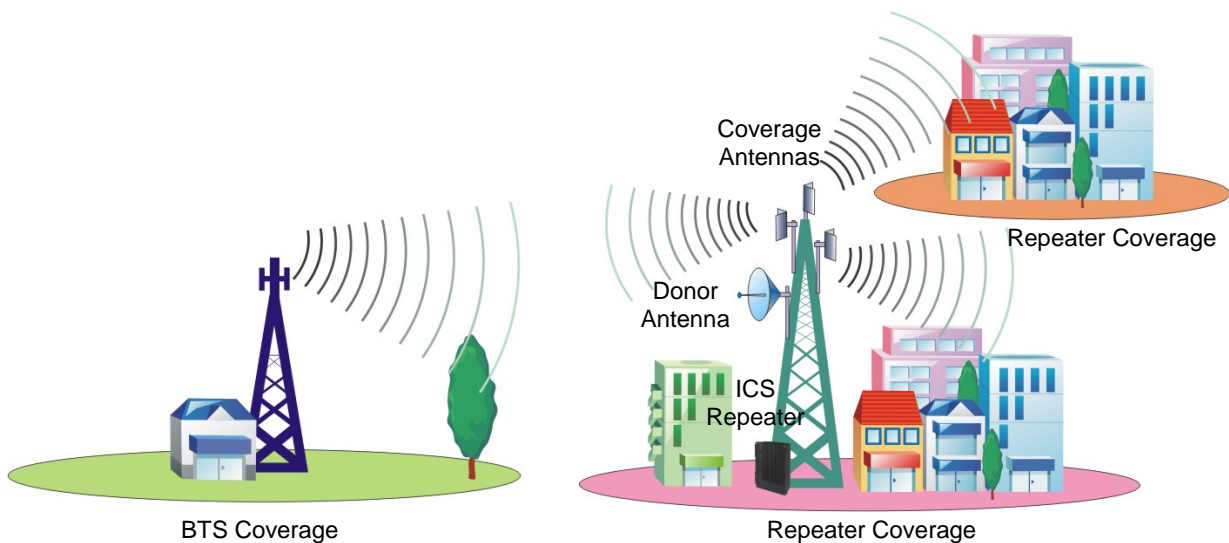
The ICS Repeater is mainly applicable to such case:

- The repeater can find an installation place which can receive pure BTS signal at strong enough level and can meet the requirement of isolation to avoid self-oscillation;
- And the isolation requirement between the donor and coverage antennas is hard to meet by using a RF repeater.

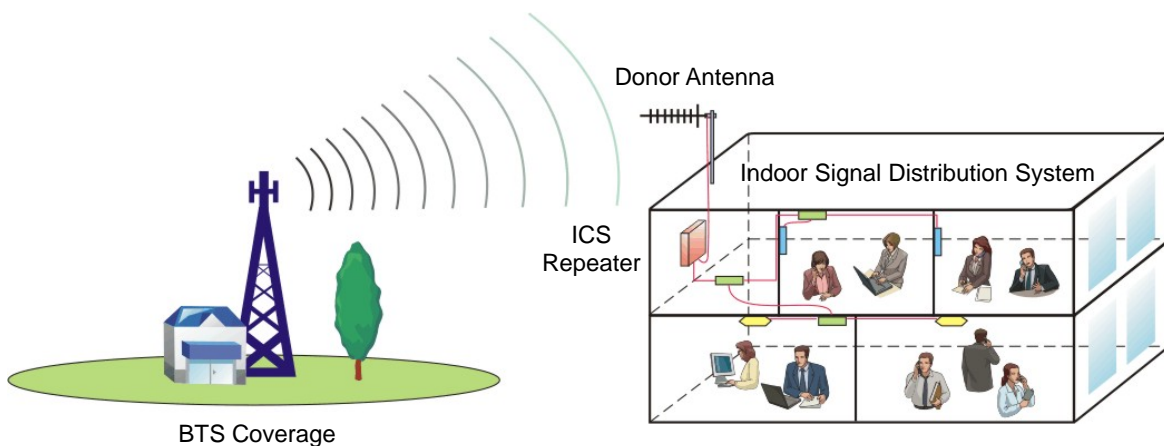
In comparison with standard RFR (RF Repeater), FSR (frequency shift repeater) and FOR (fiber optic repeater), the ICS Repeater has the following benefits and disadvantages:

Pro	Con
<ul style="list-style-type: none"> • Easy to build the installation site; • Lower cost of equipment and site-building; • Lower maintenance cost (no expense for deteriorating fiber optic cable); • The Coverage Antenna can face to the same direction of the Donor Antenna (which can not be realized by RFR). 	<ul style="list-style-type: none"> • High signal noise may be introduced since the Donor Antenna picks up signal from the air; • The repeater shall be installed within the coverage of BTS.

APPLICATION DIAGRAM



Application Diagram of Outdoor ICS Repeater



Application Diagram of Indoor ICS Repeater

TECHNICAL SPECIFICATIONS

- Specifications of GSM ICS Repeater (900MHz, 1800MHz, 1900MHz)

Items	Band-Selective ICS Repeater	Channel-Selective ICS Repeater
Working Frequency (customizable)	Uplink	890-915MHz / 1710-1785MHz / 1895-1910MHz
	Downlink	935-960MHz / 1805-1880MHz / 1975-1990MHz
Working Bandwidth	2-25 MHz (customizable)	200 kHz / Channel
Output Power (customizable)	27-43 dBm (0.5-20 W)	
Gain	≥ 95dB	
Gain Adjustment Range	1-31dB @ step of 1dB	
Operating Max. Gain	≥ Antenna Isolation + 10dB	
No. of Channels	--	8 or 12
Power Amplifier Oscillation Protection	Interference Cancellation System	
Cancellation Feedback Signals - Max. Sizes of Window	≥ 6μSec	
Interference Cancellation Range	≥ 25dB	
Frequency Error	≤ 0.05ppm	
Voltage Standing Wave Ratio (VSWR)	≤ 1.5	
Noise Figure	≤ 6dB	
In-Band Ripple	≤ 3dB p-p	
Max. Input Level	≥ -10dBm	
Spurious Emission	≤ -36dBm	
In-Band Intermodulation Attenuation	≤ -45dBc/1MHz @ 10W rated power	
System Delay	≤ 5.0μSec	
I/O Impedance	50Ω	
RF Connector	N-Type (Female)	
Temperature Range	Operation: -25°C ~ +55°C / Storage: -30°C ~ +60°C	
Relative Humidity Range	≤ 95% (non condensing)	
Power Supply (customizable)	DC +24V / AC 220V±15%, 50Hz / AC 110V±15%, 50Hz	
Backup Power Supply (optional)	4 hours	
Casing Level	IP65	
Dimensions	610mm X 445mm X 215mm	
Weight	42kg	
Remote Monitoring/Control via NMS	Supported	

- Specifications of CDMA ICS Repeater (450MHz, 800MHz, 1900MHz)

Items	Band-Selective ICS Repeater	Channel-Selective ICS Repeater
Working Frequency (customizable)	Uplink	450-457.5 MHz / 824-849MHz / 1880-1890MHz
	Downlink	460-467.5 MHz / 869-894MHz / 1960-1970MHz
Output Power (customizable)	27-43 dBm (0.5-20 W)	
Gain	≥ 95dB	
Gain Adjustment Range	1-31dB @ step of 1dB	
Operating Max. Gain	≥ Antenna Isolation + 10dB	
No. of Channels	--	8 or 12
Power Amplifier Oscillation Protection	Interference Cancellation System	
Cancellation Feedback Signals - Max. Sizes of Window	≥ 6μSec	
Interference Cancellation Range	≥ 25dB	
Frequency Error	≤ 0.05ppm	
Voltage Standing Wave Ratio (VSWR)	≤ 1.5	
Noise Figure	≤ 6dB	
In-Band Ripple	≤ 3dB p-p	
Max. Input Level	≥ -10dBm	
Spurious Emission	≤ -36dBm	
In-Band Intermodulation Attenuation	≤ -45dBc/1MHz @ 10W rated power	
System Delay	≤ 5.0μSec	
I/O Impedance	50Ω	
RF Connector	N-Type (Female)	
Temperature Range	Operation: -25°C ~ +55°C / Storage: -30°C ~ +60°C	
Relative Humidity Range	≤ 95% (non condensing)	
Power Supply (customizable)	DC +24V / AC 220V±15%, 50Hz / AC 110V±15%, 50Hz	
Backup Power Supply (optional)	4 hours	
Casing Level	IP65	
Dimensions	610mm X 445mm X 215mm	
Weight	42kg	
Remote Monitoring/Control via NMS	Supported	

- Specifications of WCDMA ICS Repeater (2100MHz)

Items	Downlink	Uplink
Working Frequency (customizable)	2110-2170MHz	1920-1980MHz
Carrier Wave Mode	Channel Selective / Band Selective	
Carrier Quantity	8 or 12 channels	
Max. Output Power (customizable)	27/30/33/37/40 dBm (+0dB/-2dB)	27/30 dBm (+0dB/-2dB)
Frequency Error	≤ 0.01ppm	
Gain	≥ 90dB	
Gain Adjustment Range	1-31dB @ step of 1dB	
Operating Max. Gain	≥ Antenna Isolation + 10dB	
Power Amplifier Oscillation Protection	Interference Cancellation System	
Cancellation Feedback Signals - Max. Sizes of Window	≥ 6μSec	
Interference Cancellation Range	≥ 25dB	
Adjacent Channel Power Ratio (ACPR)	P ≥ 31 dBm	(Offset 5MHz) ≤ 49dBc (Offset 10MHz) ≤ 54dBc
	P < 31 dBm	(Offset 5MHz) ≤ 50dBc (Offset 10MHz) ≤ 55dBc
Noise Figure	≤ 4dB	
In-Band Ripple	≤ 3dB p-p / 3.84MHz	
Spurious Emission and IMD3	Comply with 3GPP TS 25.106 V6.0.0	
System Delay	≤ 5.0μSec	
Voltage Standing Wave Ratio (VSWR)	≤ 1.4	
Out-of-Band	2.7 ≤ f_offset < 3.5MHz	≤ 60dB
	3.5 ≤ f_offset < 7.5MHz	≤ 45dB
Gain	7.5 ≤ f_offset < 12.5MHz	≤ 45dB
	12.5 ≤ f_offset	≤ 30dB
Peak Code Domain Error (PCDE)	≤ -35dB	
Error Vector Magnitude (EVM)	≤ 12.5%	
I/O Impedance	50Ω	
RF Connector	N-Type (Female)	
Temperature Range	Operation: -25°C ~ +55°C / Storage: -30°C ~ +60°C	
Relative Humidity Range	≤ 95% (non condensing)	
Power Supply (customizable)	DC +24V / AC 220V±15%, 50Hz / AC 110V±15%, 50Hz	
Backup Power Supply (optional)	4 hours	
Casing Level	IP65	
Dimensions	610mm X 445mm X 215mm	
Weight	42kg	
Remote Monitoring/Control via NMS	Supported	

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