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Frequently Asked Questions

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IDAS Frequently Asked Questions

Section 1: General Questions about IDAS and NXDN™

Q1: Exactly what is IDAS and NXDN™?

A1: NXDN™ stands for Next Generation Digital Narrowband, and is a 6.25 kHz (and 12.5 kHz) FDMA digital protocol developed jointly by Icom Incorporated and Kenwood Corporation. It was initially developed as a solution to the FCC mandate and requirement of having 6.25 kHz or equivalent capability for VHF and UHF Land Mobile Radio products by 1st January, 2005 (A deadline since moved to 1st January, 2011).

IDAS is the name of the suite of products that Icom has developed based on the NXDN™ protocol. Similarly, Kenwood Corporation has developed a suite of NXDN™ compliant products and calls that system Nexedge™.

Q2: Is there compatibility in the NXDN™ protocol (digital mode) between Icom and Kenwood?

A2: In CONVENTIONAL digital mode, the features listed below have been tested for compatibility between Icom's IDAS radios and Kenwood's Nexedge™ radios. Please note that compatibility testing is ongoing for other functions.

Voice Call	: Unaddressed Call
Voice Call	: Group Call
Voice Call	: Individual Call
Voice Call	: All Call
Status Message	: Broadcast
Status Message	: Voice Call
Remote Control	: Individual Call
Paging	: Individual Call
Emergency	: Group Voice Call
Emergency	: Status Call
Late Entry	: Unaddressed Call
Late Entry	: Group Call
Encryption Voice Call	: Unaddressed Call (Subscriber and Repeater)
Encryption Voice Call	: Group Call (Subscriber and Repeater)
Voice Repeat Operation	: Unaddressed Call
Voice Repeat Operation	: Group Call
Voice Repeat Operation	: Individual Call

However, in the trunking mode, Icom and Kenwood have incorporated different implementations of trunking functionality, and at this time, these two trunking systems are not compatible. There is also no compatibility between Icom and Kenwood's Short Data Message call features.

Q3: How much is the price difference between Icom and Kenwood's NXDN™ systems?

A3: Icom cannot comment on a competitor's specific product pricing. Please make your own research from information available in the market.

Q4: Will there be an ETSI standard for IDAS or NXDN™?

A4: No. ETSI has just published a Tier 2 (Licensed PMR radio) version of the dPMR (digital Private Mobile Radio) 6.25 kHz FDMA standard that is designated as TS102 658. Because of this, NXDN cannot be considered as a separate ETSI standard. However, it is still possible to sell NXDN™ compliant products in the EU if they have the relevant R&TTE Directive type approval from a Notified Body.

Q5: What is the difference between IDAS, dPMR and DMR/Mototrbo™?

A5: IDAS is based on the NXDN™ protocol (See Q1 above), which is a 6.25 kHz FDMA technology.
DMR is based on a 12.5 kHz 2 slot TDMA protocol developed by Motorola. Motorola call their DMR compatible products and system Mototrbo™.
dPMR is also a 6.25 kHz FDMA protocol, but its protocol structure is different from NXDN™.
All three protocols are not compatible with each other.

Q6: If the pursuit to make IDAS (NXDN™) a de-facto standard, will Icom and Kenwood make the NXDN™ protocol open to other companies?

A6: Yes, the NXDN™ Forum has been formed for this purpose. So far a total of six companies have the CAI and testing specification now. At this time, only Icom and Kenwood have products available.
Similarly, an identical industry group exists in Europe called the dPMR MoU. It comprises of nine member companies promoting the dPMR form of 6.25 kHz FDMA technology. As this standard is an official ETSI standard, manufacturers can download it from the ETSI website and develop products based on that.

Q7: It has been stated that IDAS/NXDN™ is a proprietary system. Is this the case?

A7: Icom is aware of such statements being made by a competing technology/manufacturer. The definition of 'proprietary' normally means that a technology is limited to one company or is not open. NXDN™ compatible products are available from two manufacturers, Icom and Kenwood, and the protocol has been disclosed to four others as explained above.

The competitor that has stated NXDN™ as proprietary is at the printing of this document still the ONLY supplier of products based on the technology they offer. There are also no multi-vendor industry groups actively in place promoting this technology, so based on the above, it may be more appropriate to ask which technology really is proprietary.

Q8: What are the target users for IDAS?

A8: IDAS is aimed mainly at the business and industry markets, which consist of many categories like security, transportation, railways, construction, shopping malls, factories, taxi companies, hotels and more. We already have had success in supplying IDAS systems to police forces, municipalities, transportation, security and railway companies to name a few.

Q9: What other IDAS literature is there available?

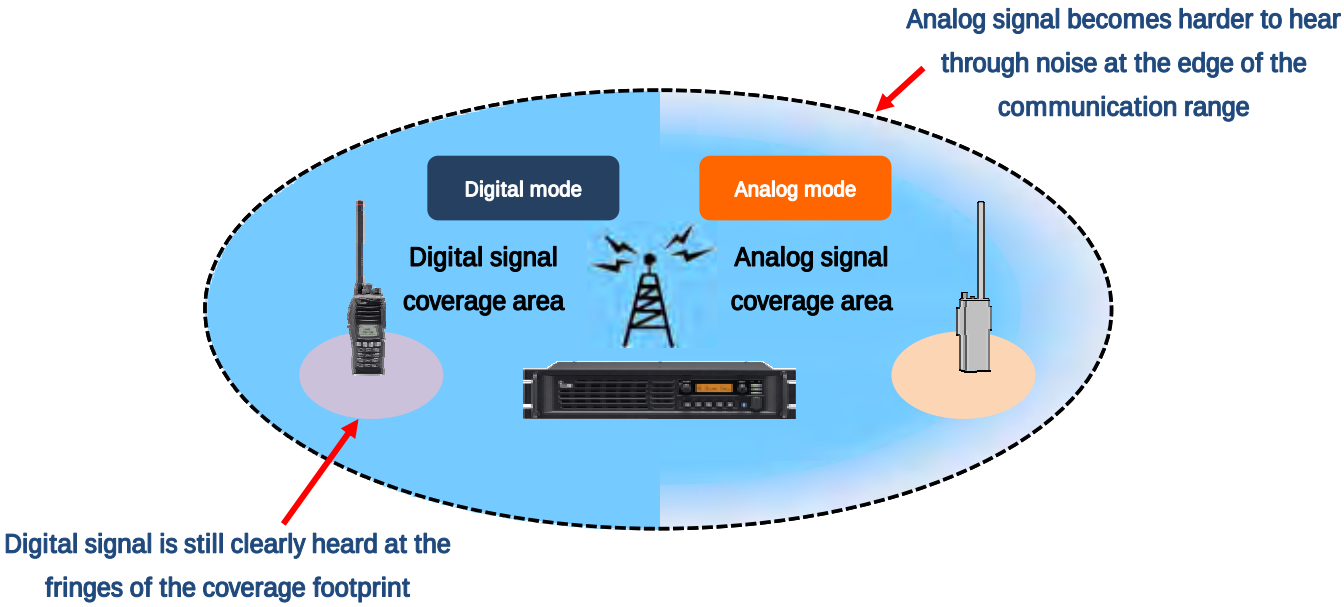
A9: Icom has prepared product catalogs, an Information Paper on FDMA vs TDMA and sales materials for our Distributors. A video about the IDAS system is now complete and is available for download from our homepage. Please visit our homepage to see what IDAS literature is available for you now. http://www.icom.co.jp/world/index.html

Section 2: Technical and Function Questions

2-1: IDAS System Related Questions:

Q1: How does the coverage in a digital communication site compare with analog FM?

A1: In field tests carried out by Icom and other third parties, we have observed IDAS communication coverage in digital mode up to 20% more than the analog communication coverage. Some reports have indicated coverage of over 80km, but as with any wireless communication system, antenna height, topography and other factors all affect total communication range. What we can say is that there is no loss in coverage in comparison with analog mode. The diagram below illustrates this coverage advantage.



Q2: How does the audio quality in digital mode compare with analog FM?

A2: Regarding digital audio versus analog audio, as indicated in the diagram above, the digital signal audio quality remains basically the same until the communication range is exceeded. The biggest difference you will notice is the lack of noise in the received audio of the digital signal. In most instances, the greater the distance between stations in analog mode, the noisier the signal gets. In digital, it sounds the same until the signal cuts off at the end of the communication range.

Q3: Is there a time delay in digital communication?

A3: Yes, there is a minimal delay between the transmission and receive in digital mode due to the characteristics of encoding and decoding voice by the vocoder. This delay is not noticeable to the user unless the receiving radio is within hearing range. The same delay occurs with cellular phones too.

Q4: What is the vocoder used in the IDAS system?

A4: It is the half-rate AMBE+2™ vocoder from Digital Voice Systems Inc.

Q5: Is it possible to receive digital communication with an analog transceiver?

A6: If it is an analog ONLY capable transceiver, then it is not possible. An IDAS capable transceiver can receive both analog and digital signals. Please note that the transmission mode is fixed to which ever mode has been set to the channel in use (I.e. Analog or digital Tx).

Q7: Is the 6.25 kHz setting for digital mode only?

A7: Yes. We have heard of people trying operation in analog mode at 6.25 kHz, but Icom does not specify operation at this spacing in analog mode and advises against use and/or testing this operation.

Q8: Is there "signaling" in digital mode?

A8: Because it is digital, there is no "signaling" as such. However, the equivalent selcall type functions like Individual Call or Group Call that you would utilize with signaling in analog mode, are available in digital mode too. For example, the RAN (Radio Access Number) feature acts like a CTCSS/DTCS code in analog mode.

Q9: How many RAN (Radio Access Number) codes are available?

A9: Up to 63 RAN codes can be programmed to a channel.

Q10: Is there a digital encryption feature in IDAS?

A10: A 15 bit digital voice scrambler is built-in as a standard feature in the IDAS digital mode. It is not true "encryption", but does provide superior communications security compared to most standard analog voice scramblers. The IDAS digital voice scrambler has over 32,000 codes to program which is about 30 times more than the 1020 codes available with the UT-110R analog voice scrambler.

Q11: Is it possible to have more than a 15 bit digital scrambler?

A11: At this stage, the NXDN™ specification only allows for the 15 bit scrambler, but it is a standard feature of the system (Unlike optional scramblers for analog). It is still undecided if a more secure digital voice scrambler will be implemented.

Q12: Is the IDAS digital protocol the same as the protocol in the UT-118?

A12: No. The UT-118 protocol is the D-STAR protocol. It is not compatible with IDAS.

Q13: Is it possible to use the IDAS digital unit (UT-126H) in the IC-V82 for example?

A13: No. The connector pin assignment and number of pins are different between each model, and the IC-V82 is not designed to operate with the IDAS protocol.

Q14: Is the IDAS software (firmware) the same for mobiles and handheld radios?

A14: Yes. As a result there is also only one version of the programming software.

Q15: Is it possible to make an ID list for each transceiver with a PC?

A15: It is possible (IDAS has this capability) but there is no application software right now to do this.

Q16: Is there a Voting function in the digital mode?

A16: At this time no, but we are planning to add this in an upgrade in the near future.

Q17: Is full-duplex operation possible?

A17: For the radios, full-duplex operation is not possible. However, the repeater can be configured for full-duplex operation. The radios will receive and transmit on the respective frequency pair, but PTT action for RX and TX is still required.

Q18: Will a beacon like polling as in D-STAR also be implemented in IDAS?

A18: While IDAS is a completely different system to D-STAR, there is a function in the IDAS repeater to allow the transmission of the repeater's ID code, called CW ID Tx.

Q19: What is the minimum set up of a system for the migration from analog to digital?

A19: Icom has prepared a "Quick Guide-Basic Demonstration" document where this operation is explained in detail. Please contact your authorized Icom Distributor for details.

Q20: Having to push the "Digital" button to access the digital functions can be a little difficult to use. Will there be a user interface update?

A20: We are continually listening to user feedback on many features, and are looking at what we can improve in future updates, including the user interface.

Q21: Will there be an IDAS receiver only type of product developed?

A21: There are no plans at this stage, but if in the future there is demand for such a device, we may.

Q22: What are the future development plans for the IDAS system?

A22: At the moment we have the digital conventional and digital trunking features available for IDAS. While a timetable is still not fixed, Icom has the following enhancements planned for the IDAS system.

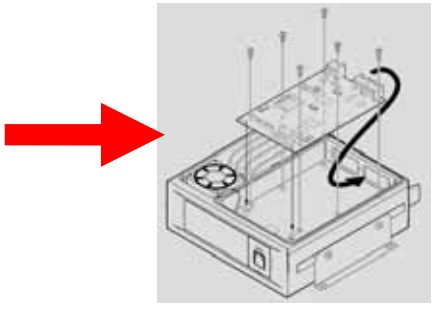
a) *An IDAS PC Feature:* This will allow a PC to basically be an IDAS radio. A software development kit will be provided that will allow the user or third parties to design the User Interface, what functions are to be used and other capabilities to customize the system to their requirements.
b) *Conventional Wide Area IP Networking:* This will allow the linking of individual repeater sites via IP to extend the communication coverage area.
c) *An IP Command Set:* This is being considered as art of the IDAS PC feature to extend the possibilities of the system enhancement. It will also compliment the serial version of the PC Command set that is available now.
d) *Multisite Trunking*: Icom plans to add this functionality in the future too.
e) Improvements and addition of functions based on market feedback.

2-2: IDAS Trunking System Related Questions:

Q1: When will IDAS trunking be available?

A1: IDAS trunking is available now with the introduction of the UC-FR5000 trunking and network controller board from November 2008.

UC-FR5000
IDAS Trunking Board



Install the IDAS Trunking Board

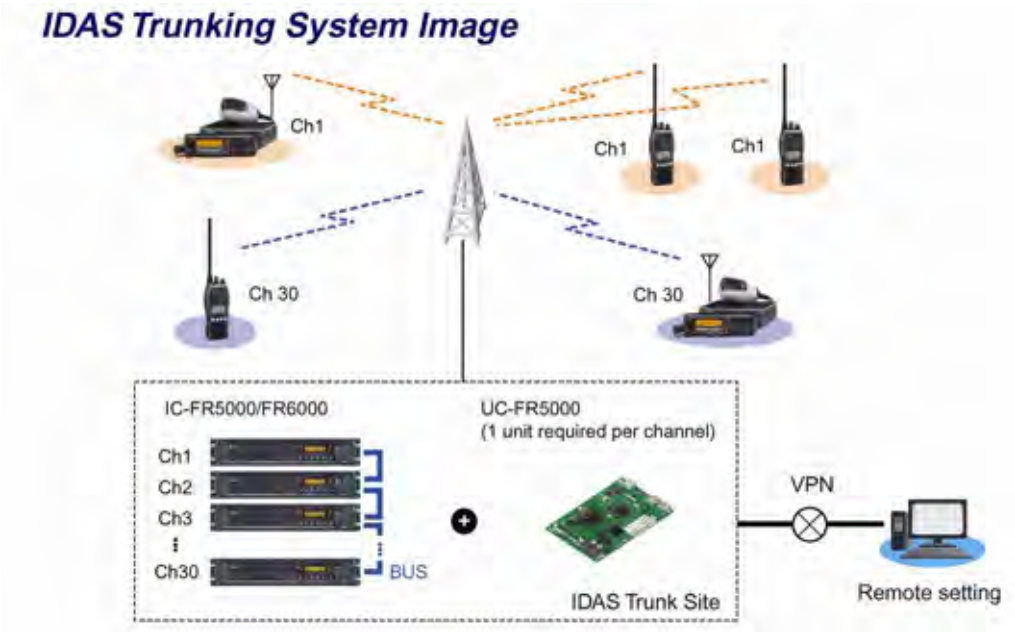
Rear View: Before and after Installation

Q2: Can current IDAS products be upgraded to be trunking capable?

A2: Yes this is possible. Please contact your authorized Icom Distributor for details about the firmware upgrade as there are some restrictions on what older firmware versions can be updated. Also, all IDAS radio and repeater products produced from October 2008 have the IDAS trunking ready firmware installed. The system can be enabled with the addition of the UC-FR5000 into the IC-FR500/FR6000 series repeaters.

Q3: Why did Icom choose an LTR™-like trunking system vs Kenwood's MPT-like trunking system?

A3: As IDAS was originally developed to meet the FCC mandate for narrow banding in LMR bands and as such the initial target market was the U.S.A. Our market research indicated that the majority of the analog trunking systems in the business and industry market were single site, LTR™ based systems, so Icom decided to develop this trunking type first.



2-3: Licensing:

Q1: What are the licensing issues associated with IDAS or 6.25 kHz in general?

A1: At this time, there are a number of countries that have implemented licensing rules or adopted the use of 6.25 kHz channels in their national band plans for professional radio. Others are looking at it. As the initial impetus for the development of 6.25 kHz technology came from the United States, they have also recently implemented rules for frequency co-ordination and how to deal with 6.25 kHz channel based systems and avoidance of interference etc. Icom has been recommending that those regulatory administrations, system owners/operators or anyone else unsure of how to regulate/utilize 6.25 kHz technology look at what the Land Mobile Communications Council in the U.S.A. has done.
An official press release can be found at: http://www.lmcc.org/filings.html

Each country or administration has their own rules on licensing and costs etc., so we recommend that you contact your local Icom Distributor or the relevant authority that regulates radio licensing in your country.

The countries that we know have regulations in place are: The United States of America, Japan (initially for license-free radios), The United Kingdom and Germany. Australia and China are now looking at implementing regulations, but as of the printing of this document, the final outcome is still unknown. Many other countries allow the use of 6.25 kHz FDMA technology if the equipment meets the required type approval compliance.

2-4: GPS and Data:

Q1: Is it possible to use a GPS microphone with an IDAS radio?

A1: Yes, the HM-170GP is available for handheld radios.

Q2: What sort of GPS receiver is available for the IC-F5060 series radios?

A2: At this time we are testing the Bionics GPS-2 GPS receiver with the IC-F5060 series. Icom is still looking at a number of mapping applications to see which the best solutions to recommend at this time are. More information will be sent accordingly.

Q3: When the GPS microphone is used, what sort of information is displayed on the radio?

A3: Nothing is displayed on the radio screen, but it is possible to use third party mapping software to show where a particular radio/vehicle is when using the GPS functionality.

Q4: What is the speed of the GPS data in the digital mode?

A4: The data transfer rate of one channel in an IDAS radio is 4800 bps in digital mode, so the GPS data speed is also 4800 bps. The data speed from the GPS microphone to the radio is also 4800 bps.

Q5: Is it possible to use a digital channel exclusively for data?

A5: Yes, but at this time there is no application available to utilize this. Icom is working on such an application to use a channel as a data channel now.

Q6: Is it possible to send Voice and Date simultaneously?

A6: No, 'simultaneous' transmission of voice and data is not possible. The data transfer rate is fixed at 4800bps with 3600 bps available for voice or data. Voice actually uses 2450 bps, but the remaining data amount is not sufficient enough to allow simultaneous transmission of data like GPS co-ordinates. This is a characteristic of the system itself. The radio can be set to send “Data=Voice” or “Voice-Data” in the order you desire upon PTT action. In actual use, the result is almost the same as if it was being sent simultaneously. In IDAS trunking, the repeater information is send simultaneously with voice.

Q7: Is there a limitation on the number of text characters that can be input for a short data message?

A7: At this time yes, the maximum number of characters that can be used in a message is 12 characters.

Q8: Can a short text message be input directly from the keypad?

A8: Yes, a message that has been pre-programmed first from the programming software can be edited directly from the keypad of the radio. It is also possible to input a 12 character message directly when in the “Message” mode.

2-5: Repeater, PC and IP Related Questions:

Q1: Can the IDAS repeater distinguish between analog and digital signals?

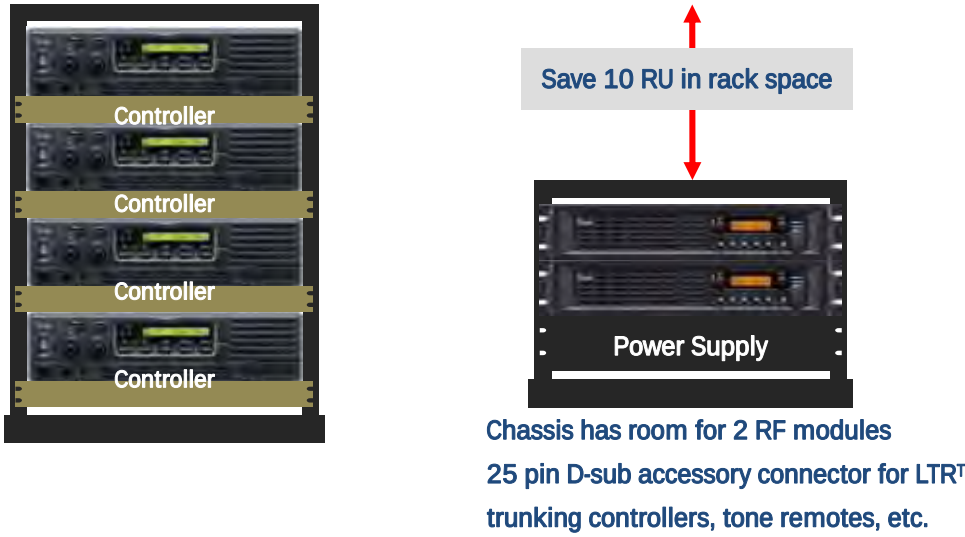
A1: Yes, it has the same "dual-mode" receive capability as the radio terminals. The repeater will receive and transmit (=relay) the mode sent over the air (I.e. Analog or digital).

Q2: Is the IDAS repeater a single channel repeater?
(As opposed to the Mototrbo™ repeater being a two channel repeater)

A2: As shown in the picture below, the IC-FR5000/6000 series have the space to install two optional RF units called the UR-FR5000/6000. These RF units can be installed to allow a "2 Ch. in 1 Box" configuration. Think of it as having two individual repeaters in one box. The advantage of this is allowing you to save rack space in a repeater site, as well as utilize the ability to have two operating channels.

The repeater with two UR-FR5000 series units installed.

The UR-FR5000 series unit on its own



An illustration showing the savings in rack space at a repeater site

Q3: Is it possible to use analog signaling functions like CTCSS in the IC-FR5000/FR6000 series?

A3: Yes, it is possible. All analog signaling features available in IDAS terminal products (and other analog only radio products) can be handled by an IDAS repeater.

Q4: Is it possible to connect a PC directly to an IDAS radio?

A4: Yes, both IC-F3161 series and IC-F5060 series can be connected via the correct cables (OPC-966/U for Handheld, OPC-1122/U for Mobile) for programming of radio parameters.

The IC-F5060 series can also be connected via its D-SUB 25 pin serial port to allow radio interrogation and/or telemetry operation with PC Commands. The IC-FR5000 series repeaters can also be connected in the same way as the mobile radios.

The IC-FR5000 series repeaters with the UC-FR5000 trunking controller and network board installed can be connected to a PC via the board's Ethernet or LAN ports.

Q5: What kind of digital mode PC Commands are available?

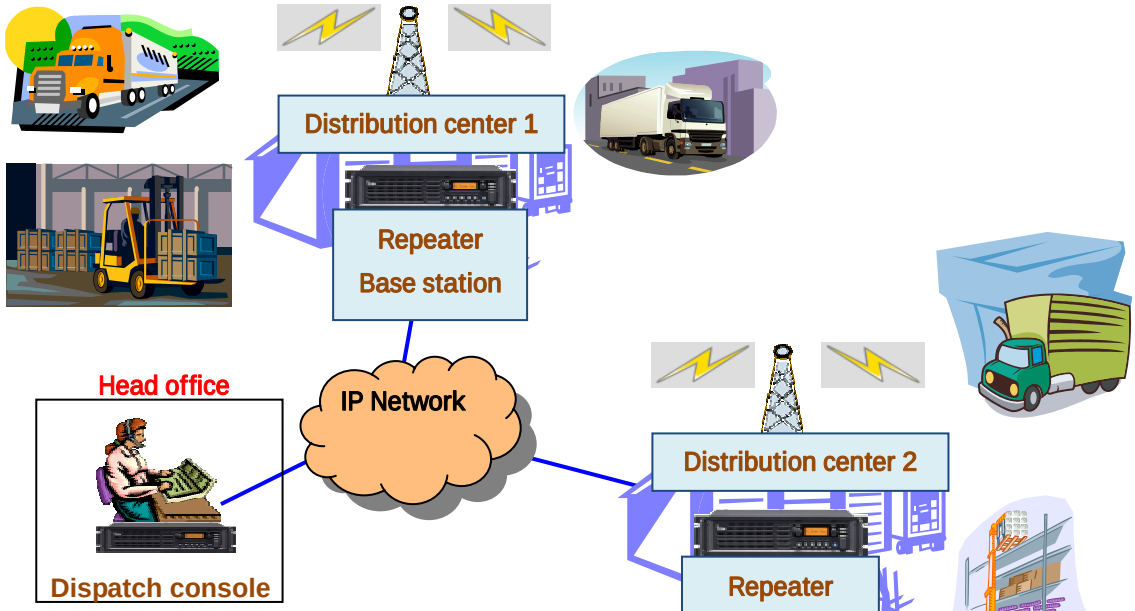
A5: A number of commands (listed below) are already available from Icom. Please ask your Icom Distributor for details on obtaining this command set under Agreement. We are currently planning to update this command set to increase the number of both analog and digital commands.

- **Common Setting**
- Replay for unknown or illegal command
- Automatic report ON/OFF
- **Radio Information**
- Obtain firmware recognition information
- Obtain cloning comment
- **User Interface**
- Reset SW control
- AF Volume control
- PTT control
- Key control
- LCD, TEXT control

- **Memory Channel**
- Memory CH selection
- RF Power control
- Scramble (Encryption) control
- **Internal state control and hardware control**
- Transmit/Receive control
- PLL/TX/RX Unlock report
- Repeater function control
- Mic Mute control
- Receiver Mute control
- Audio control
- AUX1 to AUX4 control

Q6: When will it be possible to do IP connection of repeater sites?

A6: Icom plans to have an update to allow single site conventional wide area networking by the second half of 2009 at this stage. A simple concept outline of the first phase of the networking enhancement is shown below (Final details are still to be decided and are subject to change).



Broadcast call to all repeater sites

Individual Call, Talkgroup Call or All Call is possible to other sites

Q7: Is it possible to do remote programming or control of an IDAS repeater via IP?

A7: With the release of the UC-FR5000 network card, it is possible to;

a) Set up the repeater for trunking functionality,
b) Program the trunking parameters,
c) Carry out some simple diagnostics of the repeater like PLL temperature and power connection. (But requires an application to do this which we are developing now)

The above can be done via IP connection. In the future, more advanced IP control features will be added to the system. As the UC-FR5000 is essentially a PC, it has the capacity to be upgraded with Icom and eventually third party applications to continually enhance the IDAS system.

Q8: Is it possible to do a firmware update of the repeater via IP connection?

A8: It is possible when the UC-FR5000 network card is installed into the repeater. But this only applies to models produced from October 2008 onward. For models produced before this date, updating of firmware via IP is NOT possible due to a difference in the BIOS, but firmware updating from the cloning port is possible.

Q9: Is it possible to connect to a telephone network from an IDAS transceiver through IP connection?

A9: No, it is not possible. However, a third party telephone interconnect device can be connected to either an IDAS repeater or mobile transceiver for telephone interconnect in analog and digital modes.

2-6: Servicing and Maintenance:

Q1: Is any special equipment required for the repair or maintenance of IDAS products?

A1: Icom has tried to keep the basic circuit design as similar to an existing analog FM circuit as possible, but some special equipment is required if you want to measure the sensitivity or similar specifications in the digital mode. For the most part, as the circuit hardware is the same irrespective of the operating mode, if the analog operation is working properly, then you can assume that the digital operation will be OK.

Section 3: Miscellaneous Questions

3-1: Mototrbo™ and FDMA vs TDMA:

Q1: Will Icom be developing Mototrbo™ /DMR or compatible products?

A1: At this stage we have no plans to develop Mototrbo™ /DMR or compatible products. We think IDAS is a better fit for the market overall that Icom is aiming at, and wish to promote 6.25 kHz FDMA technology since we are one of the pioneers of the technology.

Q2: Both FDMA and TDMA narrow band digital systems exist at this time. Why does Icom think that FDMA is the better solution?

A2: Icom has chosen to proceed with FDMA for the following reasons:

a) As mentioned above, we are one of the pioneers of 6.25 kHz FDMA technology.

b) FDMA has been the base technology of professional two-way radio for decades, and surmised that it was a tried and tested platform. We also basically followed the same historical pattern of narrowing the channel spacing to achieve the spectrum efficiency that is being requested to alleviate congested spectrum.

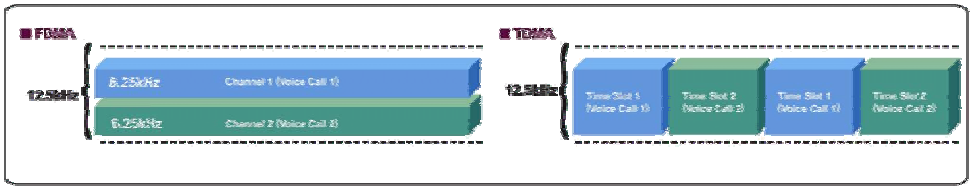
c) The idea was to create a low-cost, low complexity solution, which was achieved by utilizing as much of the existing analog FM circuit design as possible.

d) An FDMA channel is always going to be an individual channel, and therefore spectrally efficient in its true meaning. While TDMA provides the ability to increase capacity, it still uses the wider channel spacing (I.e. 12.5 kHz in the competing system). The meaning of 'efficiency' could be debated endlessly, but Icom believes that our FDMA solution is still a viable one even when 12.5 kHz channels become full.

e) As mentioned above, FDMA realizes an individual channel in either peer to peer (talkaround) mode, or in infrastructure mode (via a repeater). TDMA only realizes its efficiency when infrastructure is in place, meaning that a repeater is a necessary part of the system. Also in TDMA, in peer to peer operation in the digital mode, it is using the whole 12.5 kHz channel, but is actually only transmitting in half of it, so half of the channel goes un-used. With FDMA this does not occur.

f) While many factors define how much coverage a system can obtain, with IDAS Icom and other parties have tested the coverage as compared to analog FM. What we can say is that at a minimum, there is no loss in coverage compared to analog. In a TDMA system, coverage can be limited by the distance a radio terminal can be away from a base station before the time slot synchronization is lost. It is well known that in other TDMA systems available, that 2-3 times the number of base stations is required to achieve the same coverage as analog FM. This adds to the total cost of a TDMA system.

g) In both systems, the failure of a repeater or base station reduces the communication coverage in digital mode, but with TDMA there is also the added loss of the spectrum efficiency as explained in e) above. It should be noted that both systems lose spectral efficiency if they switched to analog operation as the back up mode. But ironically, both products would be operating FDMA in this situation.



This diagram shows the basic difference between FDMA and TDMA channel access methods.

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