

**D-STAR**

**K5TIT**



Texas  
Interconnect  
Team

**D-STAR**

DV + DD  
Digital Voice + Digital Data

# D-Star 101



Presented by

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# D-STAR

Digital Voice + Digital Data

# DV + DD



## • What is D-STAR?

- **D**igital **S**mart **T**echnology for **A**mateur **R**adio
- JARL
  - Japanese Amateur Radio League
  - **NOT** Manufacturers!
- Goal
  - Advancement of the hobby
  - Spectrum Efficiency
  - Experiment with Simultaneous Voice and Data
- D-STAR Gateway owned by Icom
  - Not Public Domain or Open Source
  - May not be copied, shared or redistributed

# D-STAR

# DV + DD

Digital Voice + Digital Data



**D-STAR is not necessarily what we expect**

**Forget everything you think you know about repeaters.**

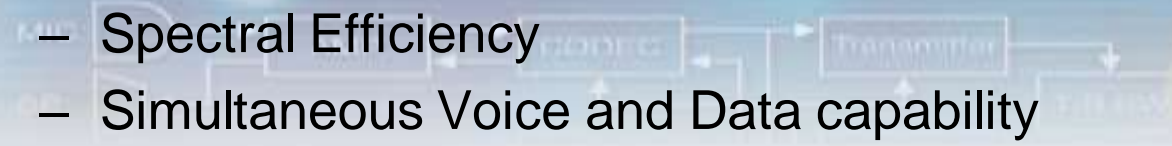
**Forget everything you think you know about networking.**

**Existing knowledge will help, IF you can ignore assumptions!**

# D-STAR

# DV + DD

Digital Voice + Digital Data



- Why is D-STAR interesting?
  - Spectral Efficiency
  - Simultaneous Voice and Data capability
    - 2m/70cm/23cm
  - High-Speed Data capability
    - 23cm
  - Internet Linking capability
  - Microwave Linking capability

# D-STAR

Digital Voice + Digital Data

# DV + DD



- Why is D-STAR interesting?
  - Spectral Efficiency
    - 6.25 kHz emission
    - 10 kHz channel spacing (reasonable)
    - More efficient use of available bandwidth
    - Allows more channels in crowded spectrum
    - Better performance compared to analog FM
      - Same power in less bandwidth (SSB vs. AM)

PRESET

CAL

SETUP

HCOPI

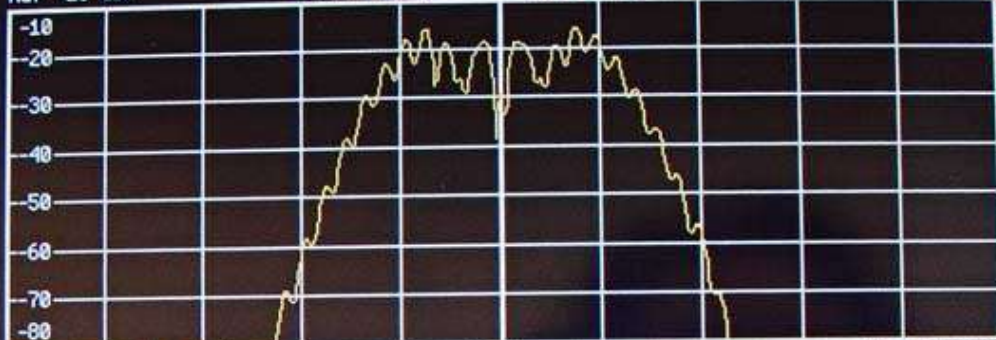
1 AP  
VIEW

IF00L  
1 AP  
VIEW

Ref -10 dBm

Att 30 dB

RBW 1 kHz  
UBW 3 kHz  
SMT 50 ms



Center 146 MHz

5 kHz

Span 50 kHz

Ref -10 dBm

Att 20 dB

RBW 100 Hz  
UBW 10 Hz  
SMT 50 s



Center 146 MHz

5 kHz

Span 50 kHz

SPECTRUM

NETWORK

FM DEMOD

SCREEN A

FILE  
MANAGER

SAVE

RECALL

EDIT  
COMMENT

ITEMS TO  
SAVE/RCL

DATA SET  
LIST

DATA SET  
CLEAR

DATA SET  
CLEAR ALL

STARTUP  
RECALL

PREV

NEXT

# D-STAR

# DV + DD

Digital Voice + Digital Data



## • Why is D-STAR interesting?

- Simultaneous Voice and Data capability
  - 2m, 70cm, 23cm Digital Voice Mode
- 4800bd Data Stream
  - 2400bd Digital Voice
  - 1200bd FEC on Digital voice
  - 1200bd Serial Data



# D-STAR

Digital Voice + Digital Data

# DV + DD

## D-Star Data Stream

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2400 Voice

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1200 FEC on Voice Only

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1200 Data

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DV Mode

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128K Data

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DD Mode



4800



- Why is D-STAR interesting?
  - High-Speed Data capability
    - 23cm
      - 128kb Ethernet
      - Transparent Bridge
        - » Allows Network-Agnostic Applications!
      - Half-Duplex
        - » Duplex-sensitive apps don't work well (VOIP, etc.)
  - Internet Linking capability
    - User linking vs. Site linking
    - Can cause confusion for uninformed
    - Allows “roaming”

## D-STAR Gateway Functions

- Authentication/Authorization
  - Register locally, propagates throughout the network
  - Without authentication, no traffic crosses Gateway
- Call Routing – (Source Routed)
  - Allows D-STAR communication, wherever you are

# D-STAR

Digital Voice + Digital Data

## D-STAR Modes

**DV** – Digital Voice – Combined Voice-and-data mode on VHF and UHF

**DD** – Digital Data – High Speed Data Stream Only on 23 cm (1.2 GHz)

Digitization is performed by a device called a **codec** (*coding-decoding*) using the AMBE 2020

AMBE also adds information to the voice data stream so that the receiving codec can correct errors introduced during the transmission (FEC)

**D-STAR**

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# Programming