

**D-STAR**

Digital Voice + Digital Data

DV + DD



# D-Star Bits & Bytes – Exam Review

## Gateways and Dongles and Reflectors, Oh My

### DV Dongles in use in the Real World

### Something New

Robin Cutshaw – AA4RC

# D-STAR

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## Digital Smart Technology for Amateur Radio Open Protocol

<http://www.jarl.com/d-star/shogen.pdf>

### Appendix

#### AP1 Scrambler

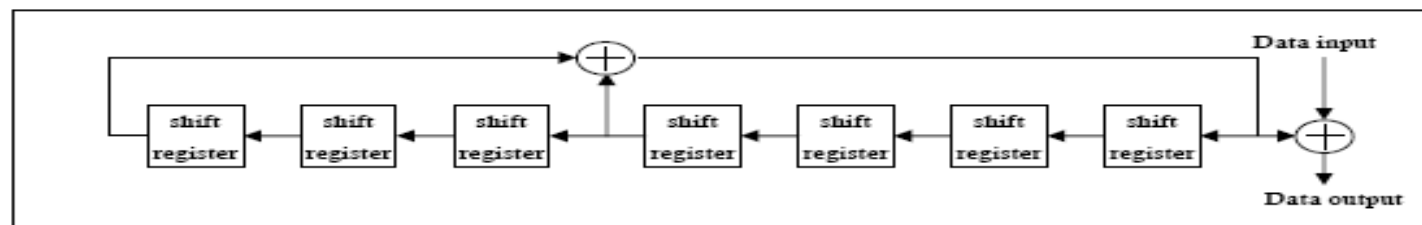
Scrambling is implemented as follows to eliminate errors when the same bit patterns are received continuously.

##### AP1.1 Scramble codes

$$S(x) = x^7 + x^4 + 1$$

Initialization defines

. Initialization begins the scrambling process.





# D-STAR

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### D-Star Voice/Data Packet Format

#### 2.1.2 Frame structure of voice packet

Radio Header											Data							
Bit Syn	Frame Syn.	Flag 1	Flag 2	Flag 3	ID					P_FCS	Voice Frame	Data Frame	Voice Frame	Data Frame		Voice Frame	Data Frame	
					Destina- tion Repeater Callsign	Depart- ure Repeater Callsign	Compa- nion Callsign	Own Callsign 1	Own Callsign 2									
64bit	15bit	1	1	1	8byte	8byte	8byte	8byte	4byte	2byte	72byte	24byte	72byte	24byte		72byte	24byte	

1 ← byte — error correction 660bit —————→

# D-Star Frame Decode

[illegible]

```

Header:
Flag1: 0x40 01000000
Flag2: 0x00 00000000
Flag3: 0x00 00000000
RPT2: 0x57:34:44:4f:43:20:20:47 |W4DOC G|
RPT1: 0x57:34:44:4f:43:20:20:42 |W4DOC B|
YOUR: 0x43:51:43:51:43:51:20:20 |CQCQCQ |
MY : 0x41:41:34:52:43:20:20:20 |AA4RC |
MY+ : 0x41:54:4c:04 |ATL.|
PFCs: 0x61df (GOOD)

Frame=1 bitsleft=599 (FRAMESYNC)
V=01111001101100010100110000010001011001000111111001000011000010111
D=10101010101010100001010000 aa b4 68
Frame=2 bitsleft=503
V=011110011011000101001100000100010110010001011000111111001000011000010111
D=001000100111000010001011 22 70 8b
Data: 0x34:41:42 |4AB|
Frame=3 bitsleft=407
V=011110011011000101001100000100010110010001011000111111001000011000010111
D=110011001101000010101111 cc d0 af
Data: 0x43:44:66 |CDF|
Frame=4 bitsleft=311
V=011110011011000101001100000100010110010001011000111111001000011000010111
D=101001001111000011001001 a4 f0 c9
Data: 0x55:40:00 |U@.|
Frame=5 bitsleft=215
V=011110011011000101001100000100010110010001011000111111001000011000010111
D=000011100001100011100101 0e 18 e5
Data: 0x00:57:34 |.w4|
Frame=6 bitsleft=119 (FINALFRAMESYNC)
V=011110011011000101001100000100010110010001011000111111001000011000010111
S=101010101010101010101010 aa aa aa
E=0001001101011111

```

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Header:

Flag1: 0x40 01000000

Flag2: 0x00 00000000

Flag3: 0x00 00000000

RPT2: 0x57:34:44:4f:43:20:20:47 |W4DOC G|

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YOUR: 0x43:51:43:51:43:51:20:20 |CQCQCQ |

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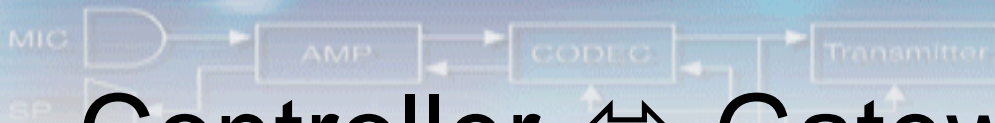
PFCS: 0x61df (GOOD)



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Digital Voice + Digital Data



## Controller ↔ Gateway Protocol

### DShark protocol decoder

```
G>C req 2007/04/09 16:02:52.686396 seq 35369 len 48 cmd 12 (v/d request)
0x0000: 44 53 54 52 8a 29 73 12 00 30 20 ff ff ff 5a 38 |DSTR.)s..0 ...Z8|
0x0010: 80 41 00 00 4b 49 34 53 42 41 20 43 4b 49 34 53 |.A..KI4SBA CKI4S|
0x0020: 42 41 20 47 41 41 34 52 43 20 20 20 4b 49 34 53 |BA GAA4RC KI4S|
0x0030: 42 41 20 47 20 20 20 20 bd a0 |BA G .. |
start flags 410000
rpt2 (KI4SBA C) rpt1 (KI4SBA G) urcall (AA4RC ) mycall (KI4SBA G/ )
fcs bda0 (GOOD) a0 bd
ctrlstrmseq 20ffffff5a38
```

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# DPLUS

## D-Star Swiss Army Knife for Gateways

Echo Test  
Repeater ID  
Simulcast to all Modules  
Script Execution  
Record Voice/Data Files  
Text Message Playback

Linking Repeaters  
Reflectors  
DV Dongles



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## DV Dongle



- D-Star from your PC/Mac without a radio



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## Abruzzo Italy Earthquake

D-Star Radios and DV Dongles  
deployed for emergency communications

IFR Communications  
donates DV Dongles to  
Law Enforcement



# D-STAR

DV + DD  
Digital Voice + Digital Data



## Adriano Basile - President & C.E.O. IFR COMMUNICATIONS

[http://www.arirelombardia.it/index.php?option=com\\_content&view=article&id=52:emergency-terremoto-abruzzo&catid=19:emergency-abruzzo&Itemid=3](http://www.arirelombardia.it/index.php?option=com_content&view=article&id=52:emergency-terremoto-abruzzo&catid=19:emergency-abruzzo&Itemid=3)

This is an official letter of thanks (plus a technical article) by the National Emergency Response Team (Telecommunications) with a specific note of gratitude to IFR COMMUNICATIONS for the support and the donation of two DV Dongles together with the details of their operational deployment.

Antonio IW2OAZ / Mauro IW2KVT / Ettore IZ2LRW / Vittorio IK2TDR



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**SOMETHING NEW !**

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DVDongleTx





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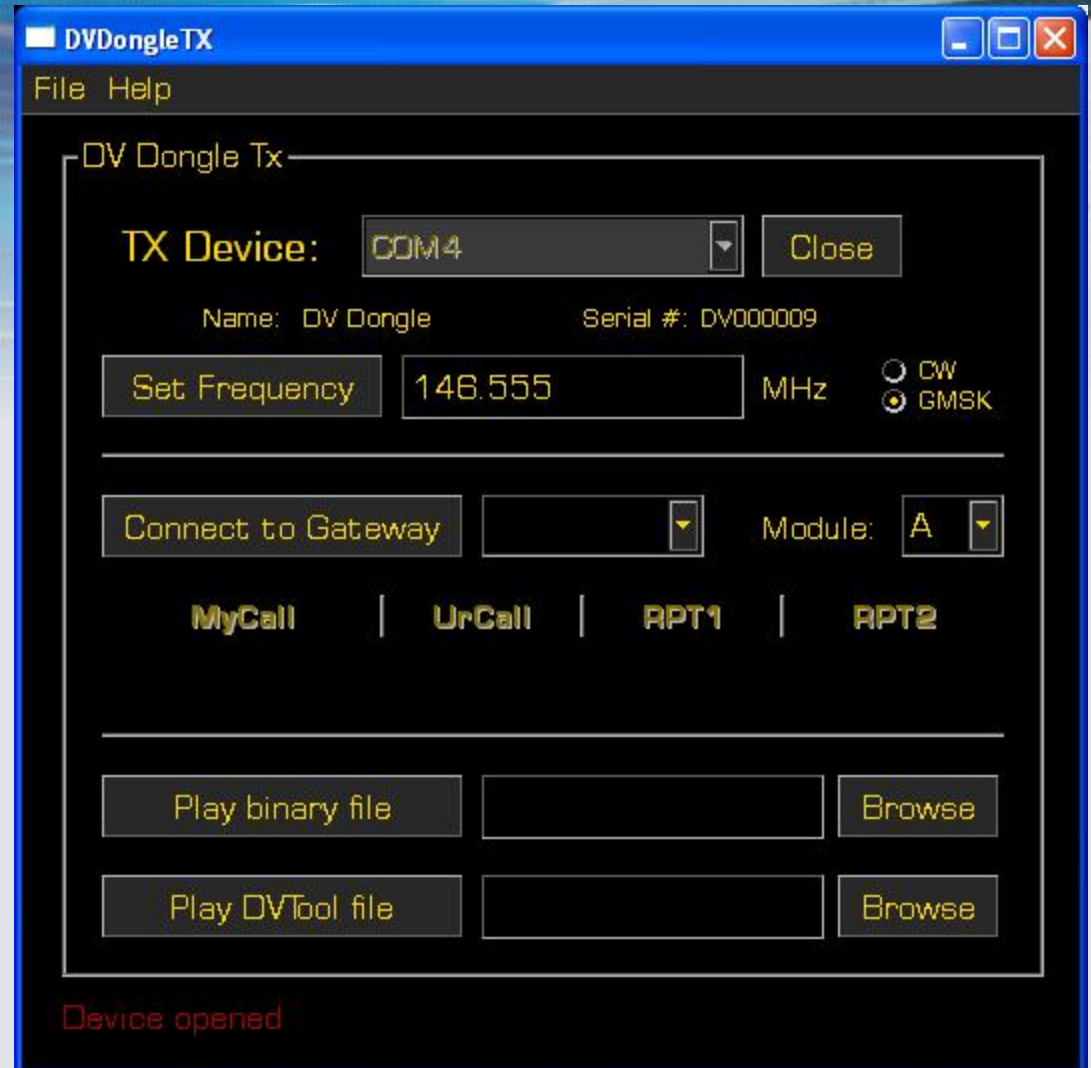
# DV + DD



Transmit D-Star GMSK  
from a PC

Windows/Linux/MacOS

2M band



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# Questions & Answers