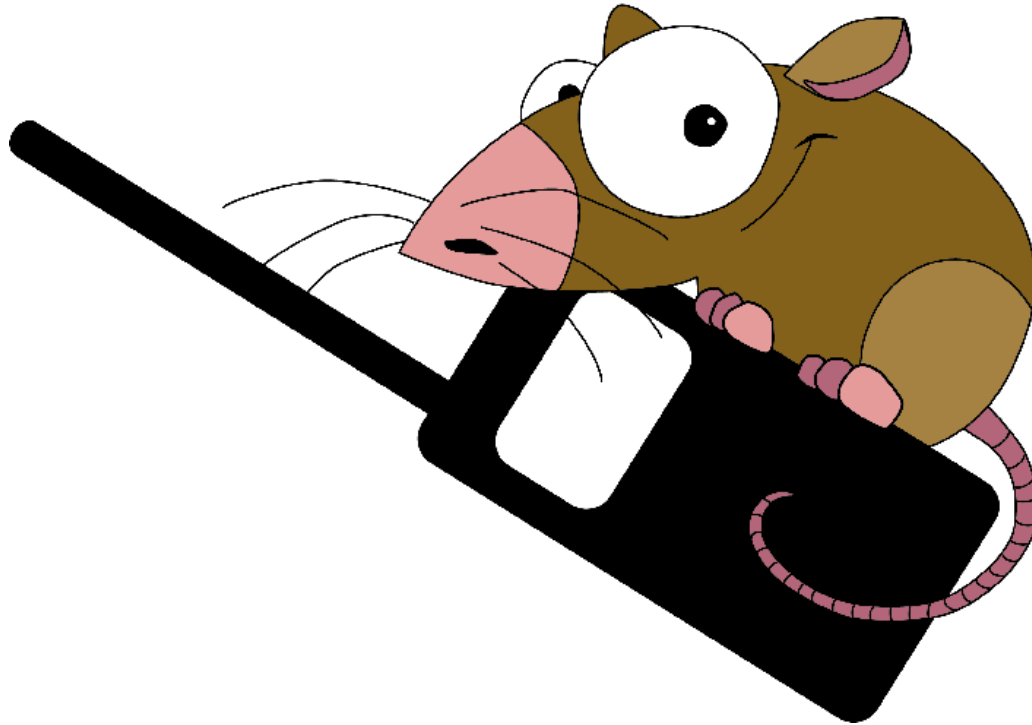


D-RATS:

Speaking Winlink and AX.25



ARRL/TAPR DCC 2010

Dan Smith - KK7DS

Overview

- (Quick) overview of D-RATS
- Winlink 2000
 - Architecture
 - Messages
 - Challenges
- AX.25
 - Reasons for learning to speak it
 - Intended support
 - Challenges

D-RATS Overview

- Designed around simplex operation for EmComm
- Requires no, nor benefits from, D-STAR network
- Email-like messaging interface
 - XML-encoded rich message formats
 - Manual or automatic routing
 - Email gateway provided
- No central server (obviously)



- Drafts
- Inbox
- Archive
- Outbox
- Sent
- Trash

Sender	Recipient	Subject	Type	Date ▲
KK7DS	N3PUG	RE: GPS	memo	11:4...
KK7DS	N7OGM-3	RE: RE: Winlink	email	13:3...
N7OGM-3	WL2K:k7eaj@...	Second test of winlink on DRATS	email	13:3...
KK7DS	N7OGM-3	Winlink	email	12:5...
KK7DS	N7OGM-3	RE: No error on GPS send.	memo	11:3...
KK7DS	K7HIO		memo	17:0...
KK7DS	K7HIO	EMAIL: Re: EMAIL: Re: EMAIL: ...	email	16:3...
KK7DS	K7HIO	EMAIL: Re: EMAIL: test	email	16:3...
KK7DS	K7HIO	EMAIL: test	email	16:3...
KK7DS	K7HIO	EMAIL: test	email	16:1...
KK7DS	VE7FKY	RE: RE: RE: RE: RE: RE: RE: stu...	email	14:2...
KK7DS	VE7FKY	RE: RE: RE: RE: RE: stuck email...	email	14:1...
KK7DS	VE7FKY	RE: RE: RE: stuck email again	email	14:1...
KK7DS	VE7FKY	RE: stuck email again	email	14:1...
KK7DS	dsmith@danpl...	email test	email	13:4...
KK7DS	dsmith@danpl...	KK7DS#Unknown	hics260	13:4...
KK7DS	dsmith@danpl...	KK7DS#1	radio...	13:4...
KK7DS	wl2k:dsmith...	One more	email	16:4...
KK7DS	wl2k:dsmith...	RMS	email	16:4...

Stations (0)

My Status

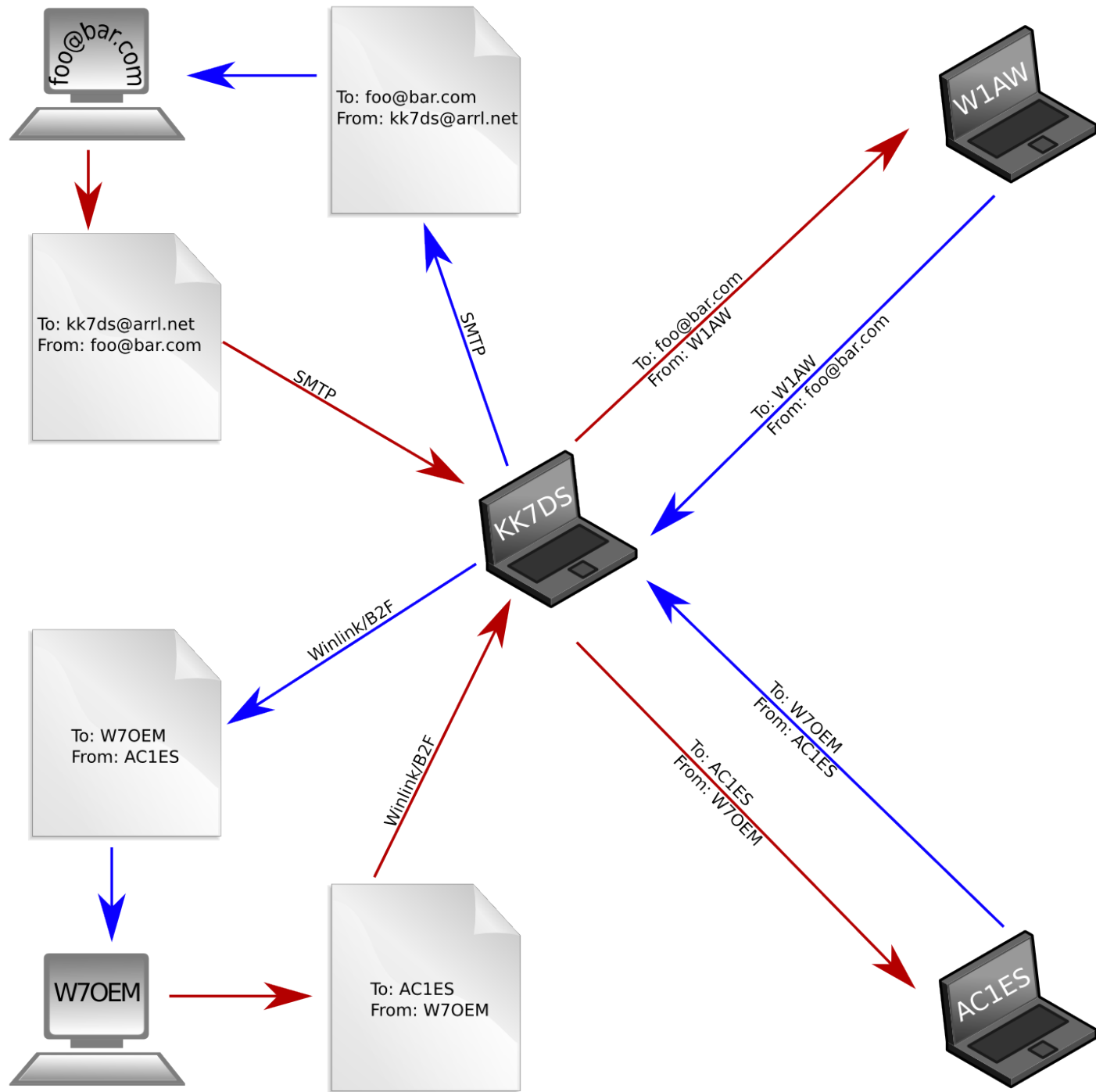
Unattended ▼

Not around

KK7DS

D-RATS Messaging

- Standard Inbox, Outbox, Drafts, Sent folders
- Messages destined for local hit the Inbox
- Anything for another station goes to the Outbox
 - Outbox becomes a queue
 - Newly heard stations trigger message send
 - Internet (SMTP, WL2K) messages go immediately
- D-RATS provides SMTP/POP3 gateway
 - Easy masquerading function
 - More transparent POP3 gateway option
 - Winlink function is more transparent, both ways

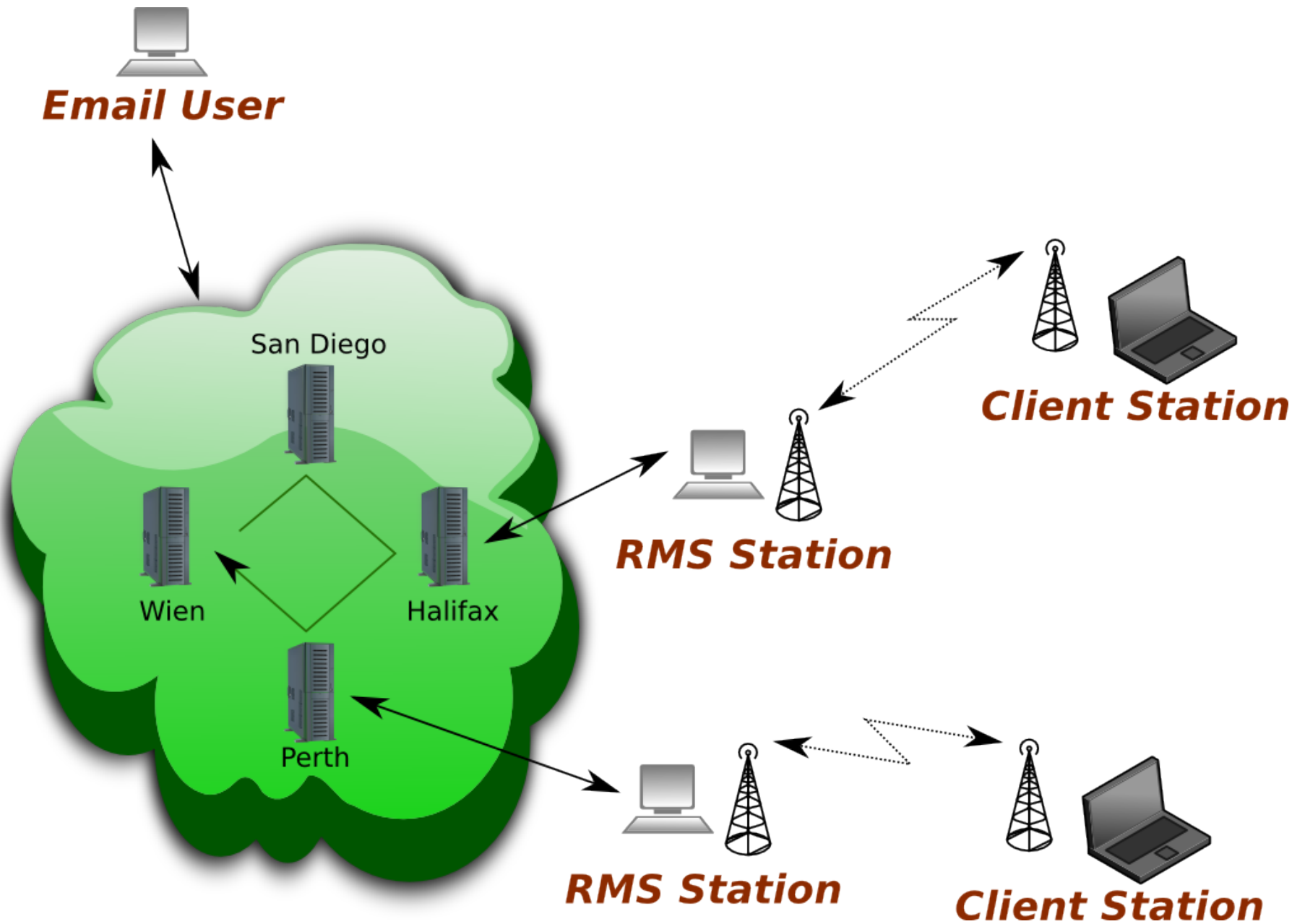


Winlink 2000

- Worldwide radio email system
- Server software: CMS, RMS Packet, RMS Pactor
- Client software: Paclink, Airmail, D-RATS (!)
- Depends on the internet
 - Expects self-healing nature to work properly
 - Bypass local outages with HF to unaffected areas

Winlink 2000 (cont'd)

- Four (or so) globally-synchronized CMS servers
 - Handle incoming and outgoing mail
 - Synchronize the “picked up” flag on each
- RMS stations around the world
 - Interface RF (Packet, Pactor) to internet (CMS)
 - Can have “relay” option for queuing messages
- Everything speaks “B2F” protocol
 - Serves a similar purpose as SMTP (kinda)
 - B2F uses LZHUF compression



Winlink 2000 Messages

Mid: 12345_K4CJX
Date: 1999/09/22 14:33
Type: Private
From: SMTP:someone@isp.com
To: KK7DS
Cc: W1AW
Subject: Test message
Body: 14

This is a test

```
<?xml version="1.0"?>
<form id="email">
  <title>Email Message</title>
  <field id="subject">
    <caption>Subject</caption>
    <entry type="text">
      Test message
    </entry>
  </field>
  <field id="message">
    <caption>Message</caption>
    <entry type="multiline">
      This is a test
    </entry>
  </field>
</form>
```

Winlink 2000 – B2

```
<- Callsign :  
-> KK7DS  
<- Password :  
-> CMSTELNET  
<- [WL2K-2.4.0.4-B2FIHJM$]  
-> [DRATS-0.3.3b4-B2FHIM$]  
<- SanDiego CMS >  
-> FF  
<- FC EM BKQRTVNLZYM 197 160 0  
<- F> 14  
-> FS Y  
*** Message Transfer ***  
-> FQ
```

Winlink 2000 Challenges

- What to do with cc: header?
 - D-RATS can't really handle this properly
- Message ID – 12 alpha digits, no namespace
- LZHUF compression:
 - Ancient 16-bit DOS code, original breaks in 32-bit land without modification
 - Slow, obscure, inefficient, limited input size
 - Questionable origin and copyright grant
- How to handle D-RATS rich forms on WL2K?

D-RATS Support for WL2K

- Easily check your Winlink mail:
 - Local internet connection
 - Through a remote station with a connection
- With AGWPE, via AX.25 to a local RMS
- Address D-RATS messages to route via WL2K:
WL2K:W1AW, WL2K:foo@bar.com, etc
- Issues may arise with CC'd messages, etc
- Provides a reasonable gateway for D-RATS users

AX.25 Support – Why?

- D-RATS already supports bare TNCs for users without D-STAR
 - No AX.25, thus no digipeating
 - Raw D-RATS frame stuffed into a KISS frame
 - Ability to use higher-speed (9600+) modems
- Easy to wrap D-RATS frames in AX.25 UI frames
- Existing digipeater resources could be used
- Integrate APRS, DPRS, and the D-RATS map

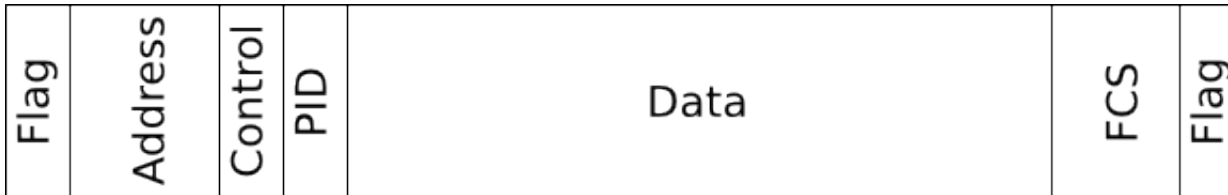
Intended support in D-RATS

- KISS TNC mode, D-RATS frames
- KISS TNC mode, AX.25 UI frames
- Rough AGWPE support
- APRS TX/RX (?)
- No support for:
 - AX.25 Layer 3 (this means no nodes)
 - Message forwarding to existing BBSes
 - Non-KISS TNCs

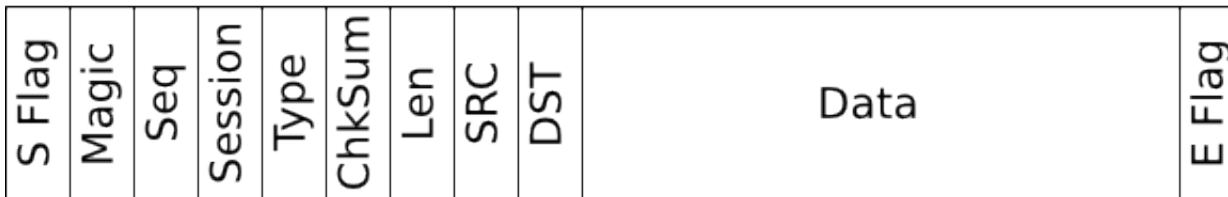
KISS Framing

- Frame delimited on either side with FEND
- FESC indicates an escaped value in next byte:
 - TFEND: FEND in the original stream
 - TFESC: FESC in the original stream
- No flow control, no checksumming, 8-bit clean
- Values:
 - FEND: 0xC0 FEND: 0xDB
 - TFEND: 0xDC TFESC: 0xDD
- D-RATS does something similar on D-STAR radios

AX.25 Encapsulation



AX.25 Information Frame



D-RATS Frame

AX.25 Encapsulation (beta)

- Currently the entire D-RATS frame in AX.25 UI
- Duplicates:
 - Source and Destination address
 - Flags and checksum
- Planned improvements:
 - Alternate packet format when using AX.25
 - Use native AX.25 addressing, FCS fields
 - “Ratreflector” could translate between the two

Challenges

- TNC buffers are small
 - D-RATS designed for D-STAR “stream”
 - Generic block fragmentation scheme needed
 - Tuning required to avoid “slow start” from increasing block size too much
- Digipeaters change timing
- Lessons learned:
 - The TNC does the HDLC (bitstuffing, flag bytes)
 - Debugging is easier with a PK-96!