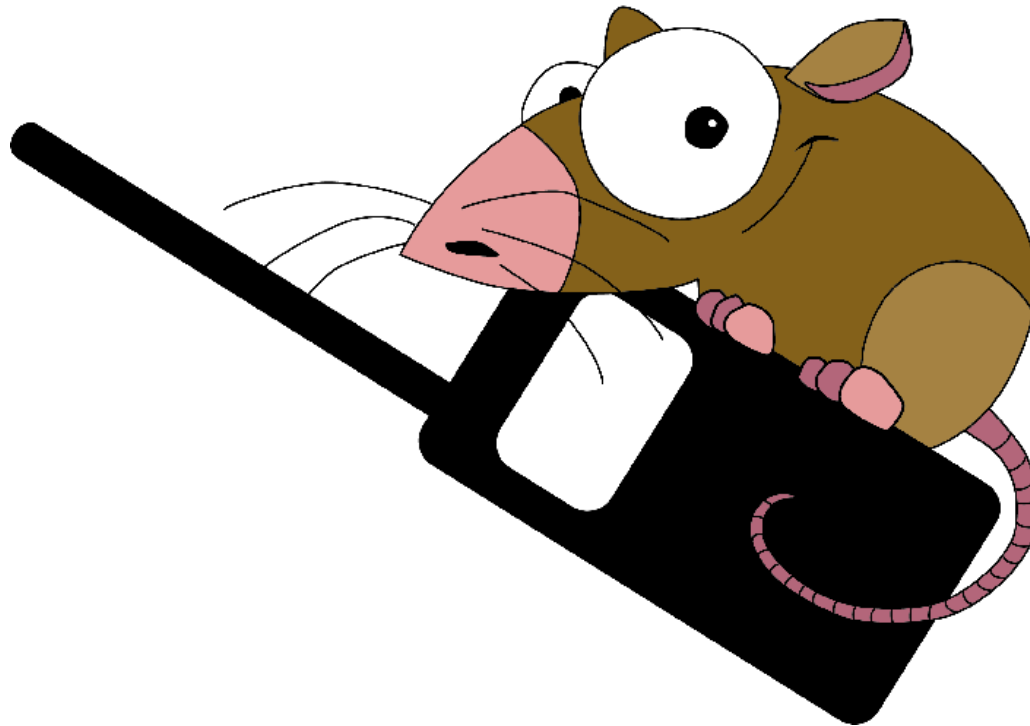# D-RATS:
Speaking Winlink and AX.25

Microhams Digital Conference 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)

File   View   Help

Messages | Chat | Files | Event Log

Stations (0)

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···

My Status
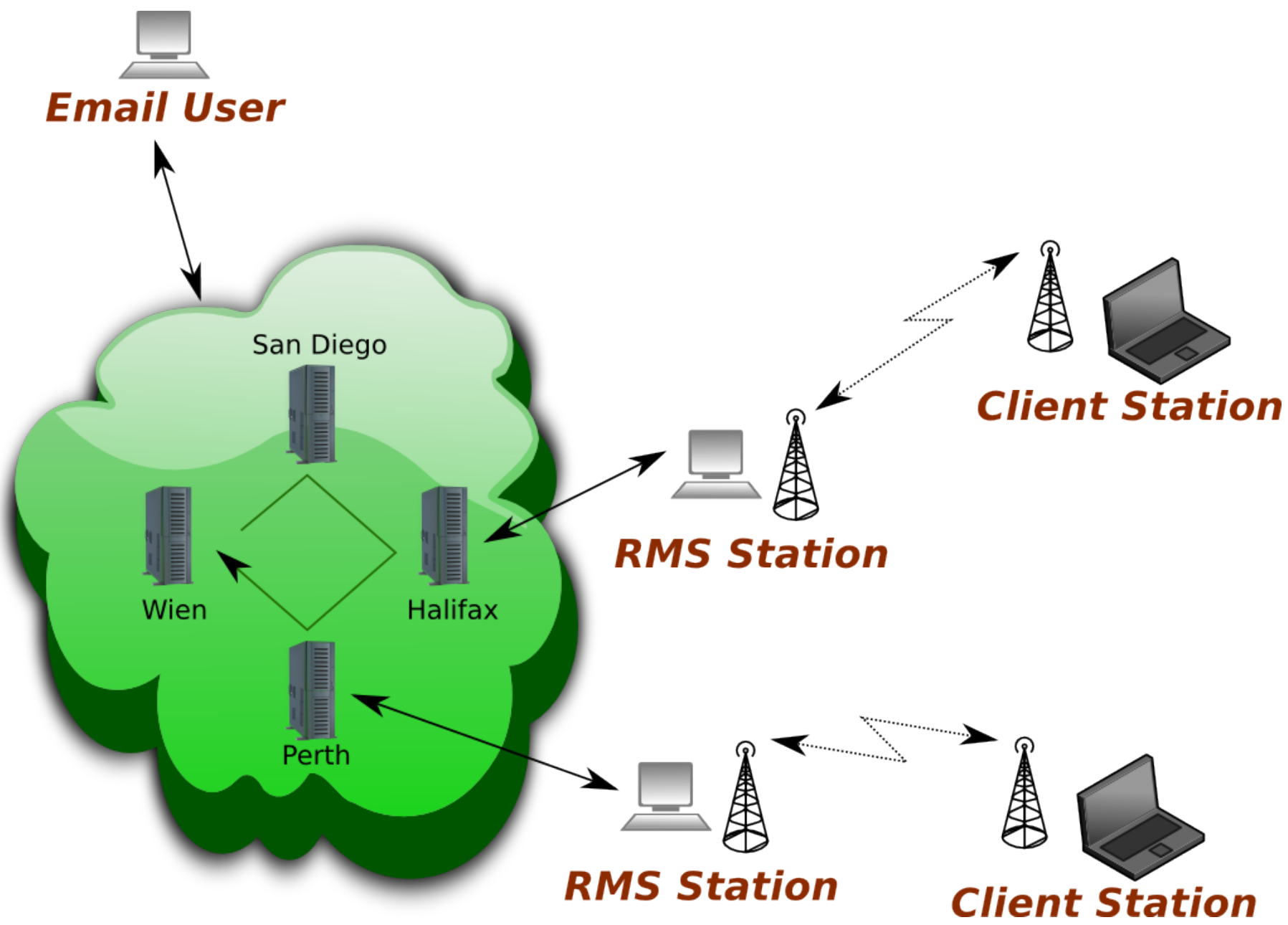
Unattended ▼

Not around

KK7DS

Winlink 2000

- Worldwide radio email system

- Server software: CMS, RMS Packet, RMS Pactor

- Client software: Paclink, Airmail, D-RATS (!)

- Depends on the internet

  - Requires self-healing nature to work properly

  - Bypass local outages with HF to unaffected areas

D-RATS

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)
  - Useless if path to the internet is gone (*)
- Everything speaks "B2F" protocol
  - Serves a similar purpose as SMTP (kinda)
  - Uses archaic LZHUF compression

Email User

San Diego

Wien

Halifax

Perth

RMS Station

Client Station

RMS Station

Client Station

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
<?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 BKQRTVNLZYMH 197 160 0

<- F> 14

*** Message Transfer ***

-> FS Y

-> 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

- B2 is documented, but not very well

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 arise with CC'd messages, etc

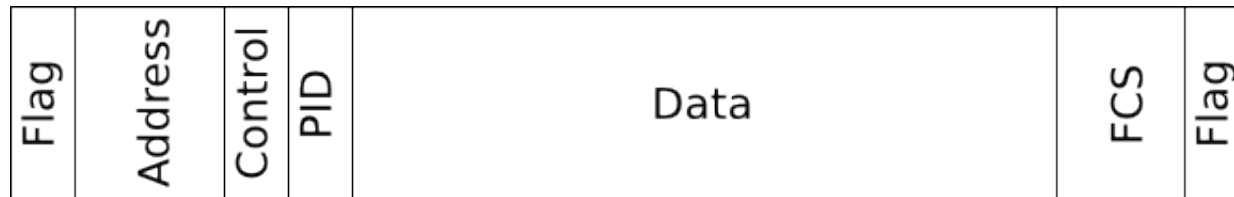- Provides a reasonable gateway for D-STAR users

AX.25 Support – Why?

- D-RATS already supports bare TNCs for users without D-STAR

- Existing digipeater resources could be used

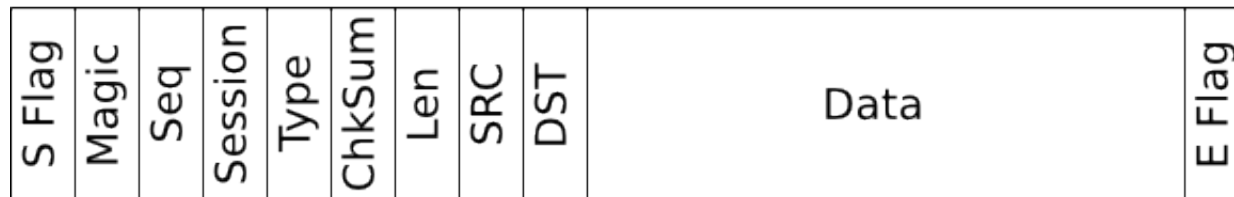- Relatively easy to wrap D-RATS packets in AX.25 UI frames

Intended support in D-RATS

- Bare KISS TNC mode (no AX.25)

- KISS TNC mode, AX.25 UI frames

- Rough AGWPE support

- APRS TX/RX (?)

- No support for:

    - AX.25 Layer 3 (this means nodes too)

    - Message forwarding to existing BBSes

    - Non-KISS TNCs

D-RATS

Encapsulation

Flag	Address	Control	PID	Data	FCS	Flag

AX.25 Information Frame

S Flag	Magic	Seq	Session	Type	ChkSum	Len	SRC	DST	Data	E Flag

D-RATS Frame

Encapsulation

- Currently stuffs the entire D-RATS frame in AX.25

- Duplicates:

    - Source and Destination address

    - Flags and checksum

- Potential improvements:

    - Alternate packet format when using AX.25

    - Use native AX.25 addressing, FCS fields

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
- The TNC does the HDLC (bitstuffing, flag bytes)
- Debugging is easier with a PK-96!

D-RATS