Intro to APRS

(APRS 101)

Automatic Position Reporting System

Suryono Adisoemarta

YD0NXX / N5SNN

Apakah itu APRS

- Automatic *Position* Reporting System
- Radio paket - *unconnected* mode
- Pengiriman data
- One-to-many (tanpa tujuan tertentu)
- Ringan (network load)
- Mudah dibuat
- Trademark dari Bob Bruninga (WB4APR)

Aplikasi APRS

- Penentuan lokasi stasiun tetap / bergerak
- Pengiriman data (*telemetri*)
- Pengiriman berita singkat
- Pantauan cuaca

Contoh aplikasi APRS

- Pengiriman posisi stasiun tetap
- Berita singkat ttg kemacetan dijalan
- Penjejakan team SAR di gunung / pantai
- Penjejakan konvoi stasiun bergerak antar kota
- Penjejakan pelari maraton / triathlon
- Penjejakan balon
- Telemetri (battery voltage, CO_2 content, temperature, konsentrasi ion, dll)
- Stasiun cuaca amatir (membantu BMG)

Cara kerja APRS

- Dengan mode radio paket
- Stasiun memancarkan info dengan *unconnected* packets
- Info:
  - Posisi
  - Pesan singkat
  - Keadaan cuaca
- Unconnected packets
  - *Satu* paket berukuran kecil (mengurangi konjesti)
  - Supaya semua bisa menerima
  - Tidak perlu mengetahui susunan jaringan
- Setiap stasiun APRS yang mampu akan mengulang-kirim (*digipeating*)
- Posisi stasiun bisa terlihat di peta lokal di komputer, atau di Internet:
  - www.findu.com
  - www.aprsworld.net

Komponen

- Komputer / Tracker:
  - Komputer + Software: APRSplus, Xastir, UI-View dan peta
  - Tracker: OpenTracker, TinyTrak,
  - HAMhud, PocketTracker, etc
- TNC / Soundcard
- GPS
  - Harus serial port dan format NMEA (USB dan/atau binary format tidak bisa)
  - tidak perlu utk stasiun tetap
- Radio:
  - Primary: 144.39 MHz
  - Secondary: 144.34 MHz

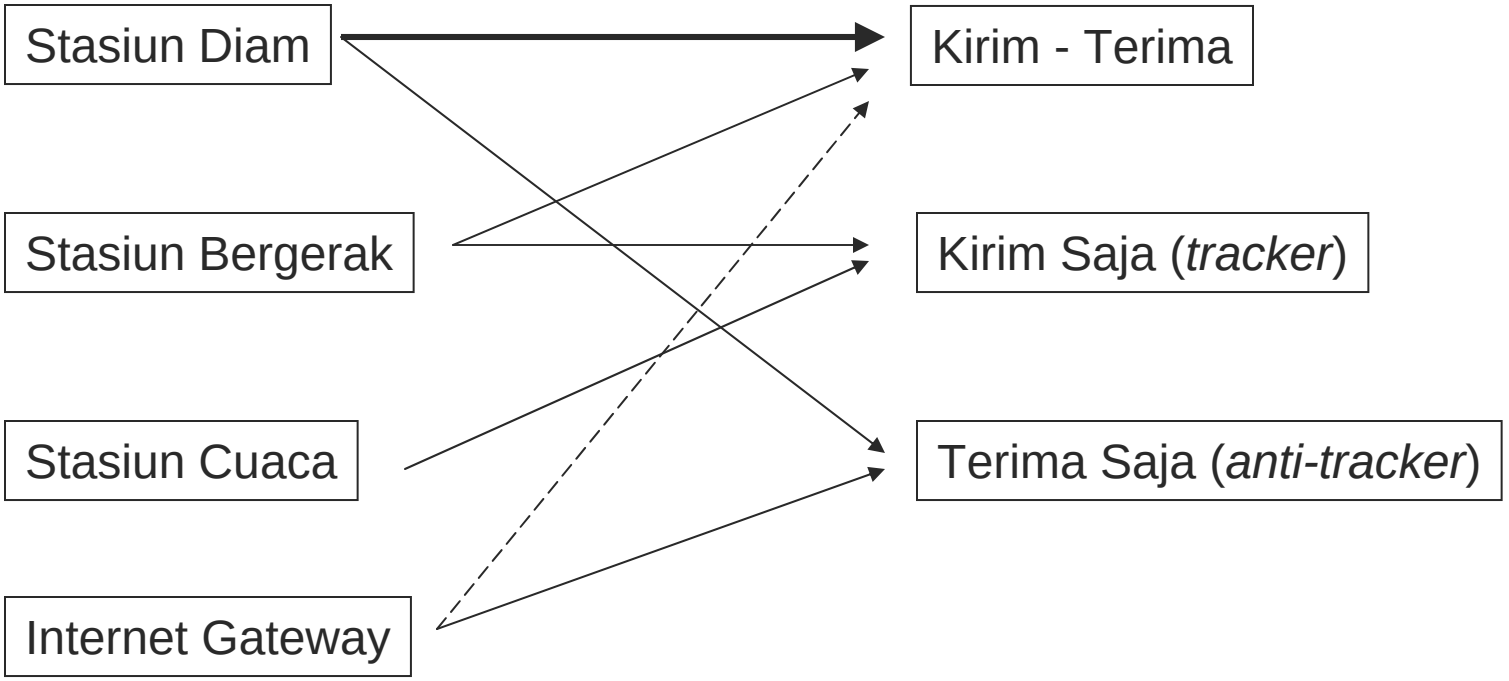
Macam Setup APRS

- Kirim - Terima
  - Stasiun APRS yang umum
  - Bisa melihat dan dilihat
  - Perlu TNC / Soundcard dan komputer
- Kirim saja
  - Hanya bisa dilihat (contoh: dipasang di pelari maraton terdepan, para pencari SAR)
  - Tidak perlu komputer
  - Namanya: *tracker*
- Terima saja
  - Hanya bisa melihat (contoh: mengamati posisi pelari maraton, atau posko SAR)
  - Namanya: *anti-tracker*

Sifat Instrument

- Bergerak
  - Mobil / motor
  - Pejalan kaki
  - Balon udara
- Diam
  - Rumah
  - Stasiun Lokal
- Cuaca
- Internet Gateway (*iGate*)

Kombinasi Stasiun APRS



Setup yang generik

- Callsign: callsign anda plus SSID
- SSID (Secondary Station ID):
  - Optional
  - Kalau punya lebih dari 1 stasiun
  - Beberapa SSID yang “reserved”
    - -7 untuk Kenwood D7 atau D700
    - -11 untuk balon
- Path:
  - Static: WIDE2-2
  - Mobile: WIDE1-1, WIDE2-1
  - **Jangan** gunakan konsensus lama (RELAY, TRACE, dll)
- Radio: simplex di 144.39 MHz (atau frekuensi lain yg ditentukan, tapi harus sama seluruh daerah)

Setup Rumah

- Komputer
- Antena luar
- TNC (atau soundcard)
- Software
- Path: WIDE2-2
- Option:
  - Link ke Internet

Setup Bergerak – Mobil/Motor

- Radio mobile rig
- APRS tracker (atau TNC)
- GPS
- Antena luar
- Path: WIDE1-1, WIDE2-1

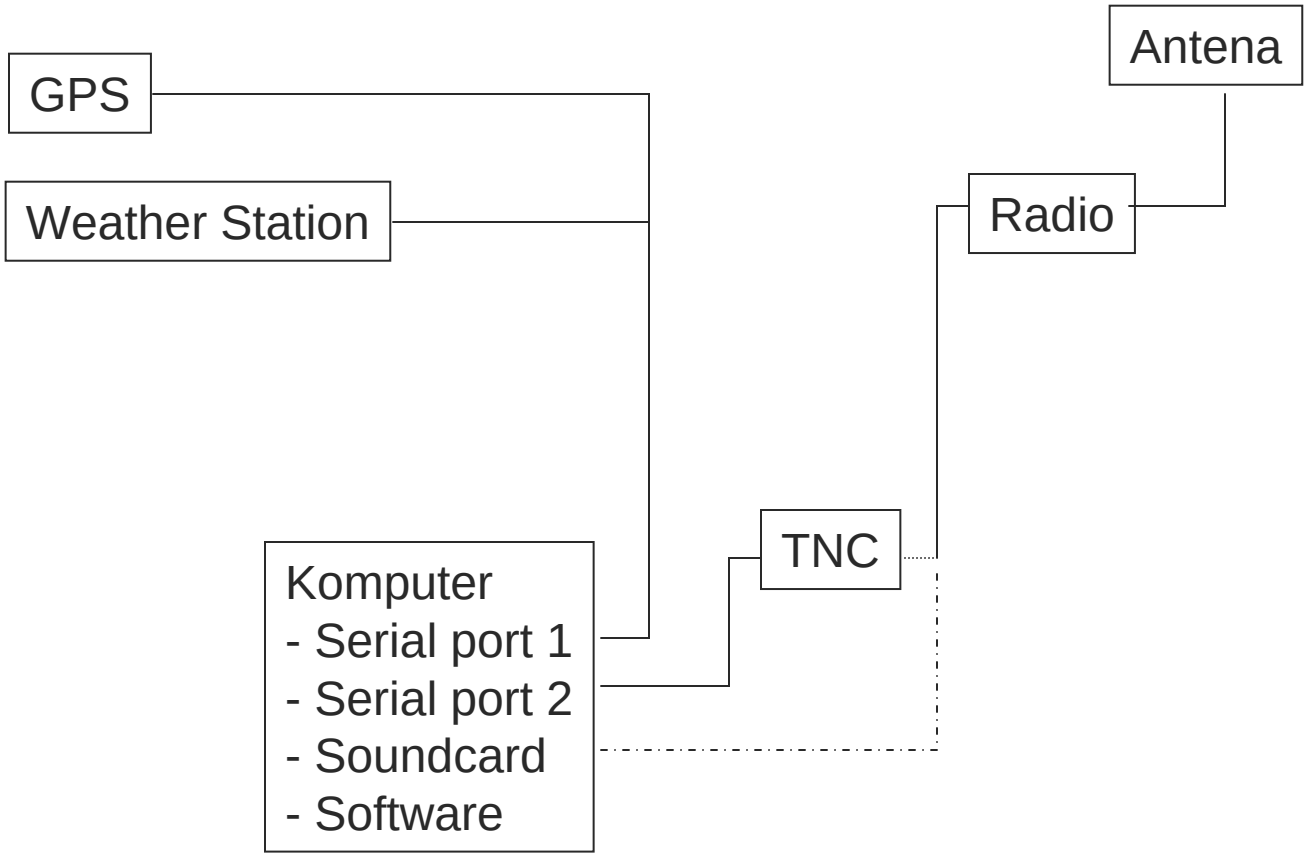
Setup Bergerak – Pejalan Kaki

- Radio jinjing
- APRS tracker
- GPS
- Path: WIDE1-1, WIDE2-1

Setup Stasiun Cuaca

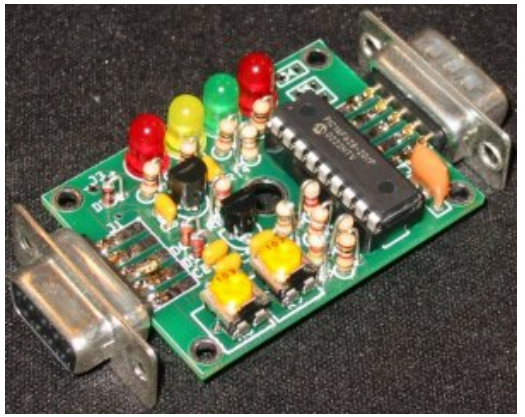
- Stasiun Tetap
- Komputer
- Instrumen cuaca
- Link ke Internet
- Optional:
  - TNC
  - GPS

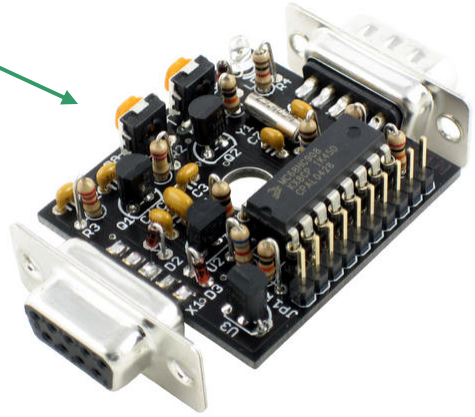
APRS Lengkap



APRS Tracker

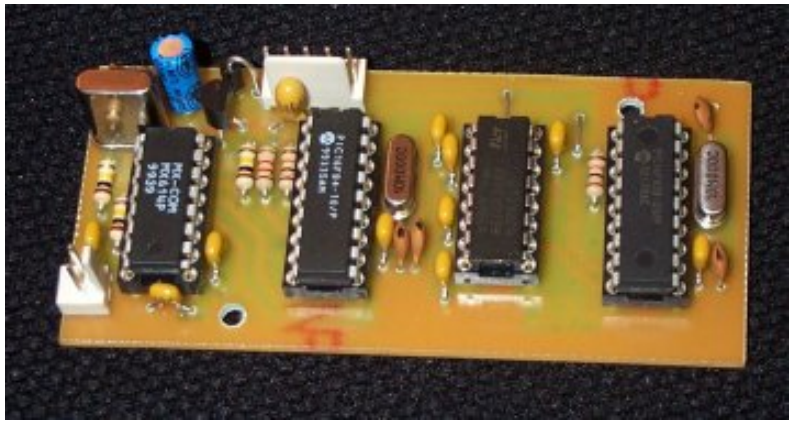
- TigerTrak TM-1
- TinyTrak
- OpenTracker
- FoxTrack





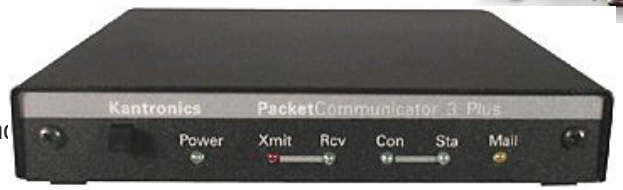
APRS Anti-Tracker

- AntiTracker by Radioactive Networks



APRS Digipeater

- Membantu memperluas pancaran stasiun berdaya kecil
- Kirim – Terima
- Tanpa komputer!
- Radio + Antena
- TNC2 *(MFJ1270, Tiny2)* (EPROM baru)
- *Tracker2* (masih beta)
- KPC 3+ (ROM version 8.2+)



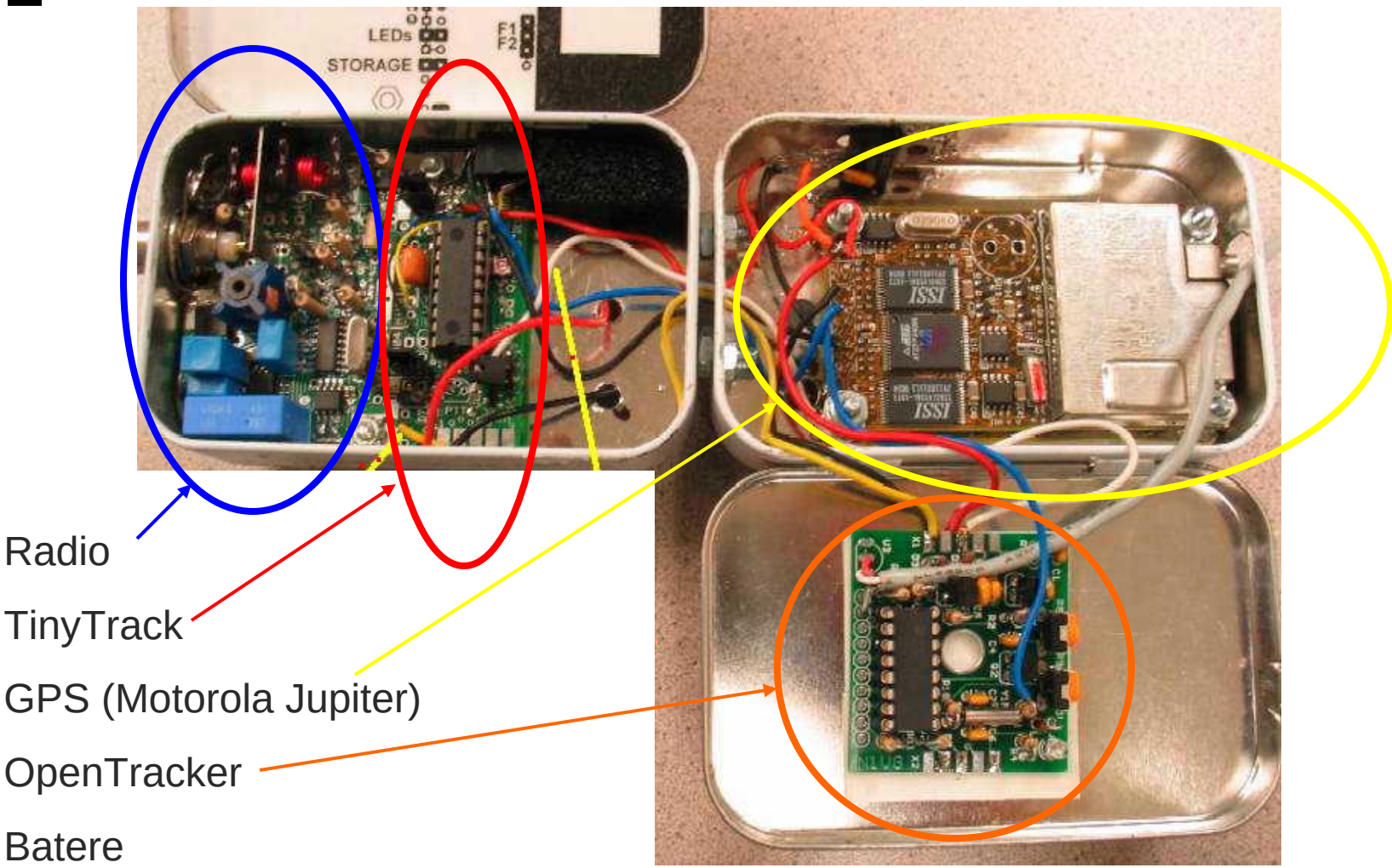
APRS in a box

- Semua (TNC, APRS, dan radio) jadi satu
- Handheld
  - Kenwood D7A(G)
- Mobile
  - Kenwood D700, D710
  - Alinco DR-135TP
    (TNC board perlu diganti)

Contoh APRS - Flying APRS

- APRS dengan 2 tracker
  - Tinytrak
  - OpenTracker
- Radio berdaya kecil (300 mW)
- GPS (Rockwell Jupiter)
- Lithium battery (8 jam operasi, bisa sampai -30^{o}C)
- Terbang ke 97,000 feet (~30 km)

Flying APRS - Piranti



Radio

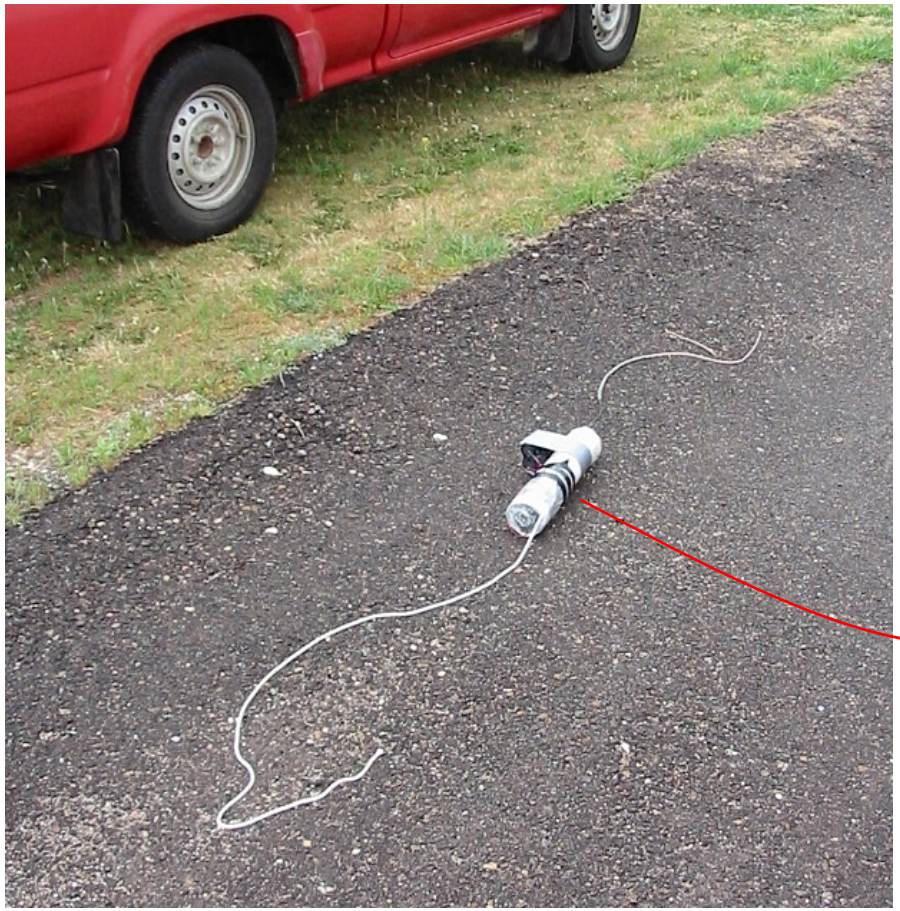
TinyTrack

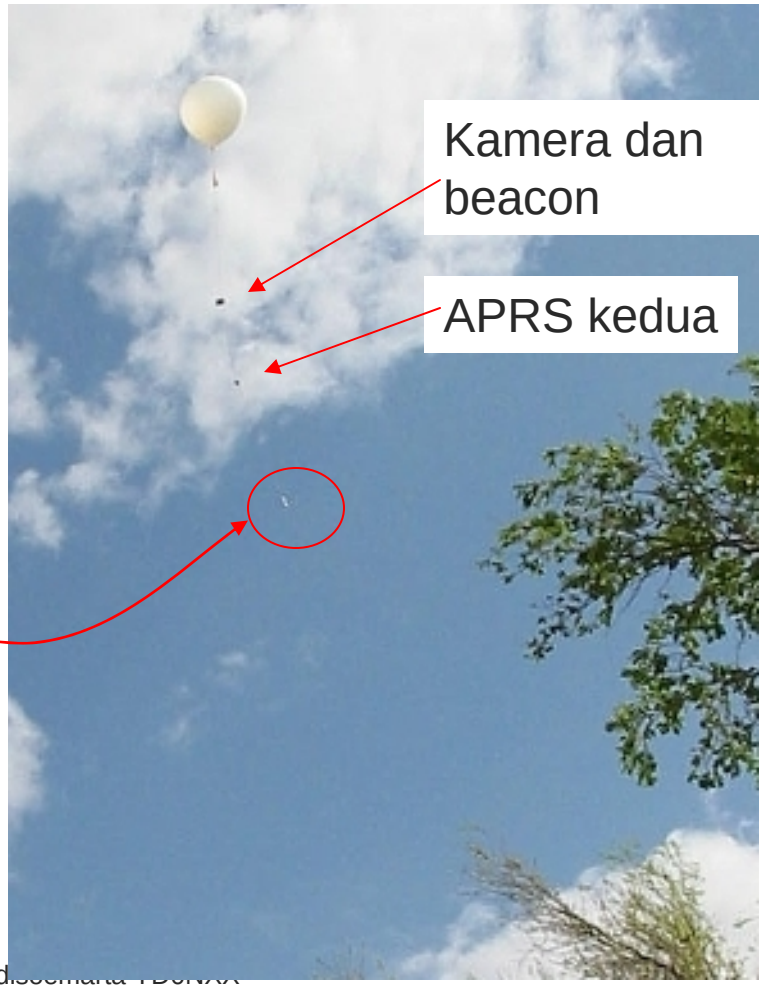
GPS (Motorola Jupiter)

OpenTracker

Batere

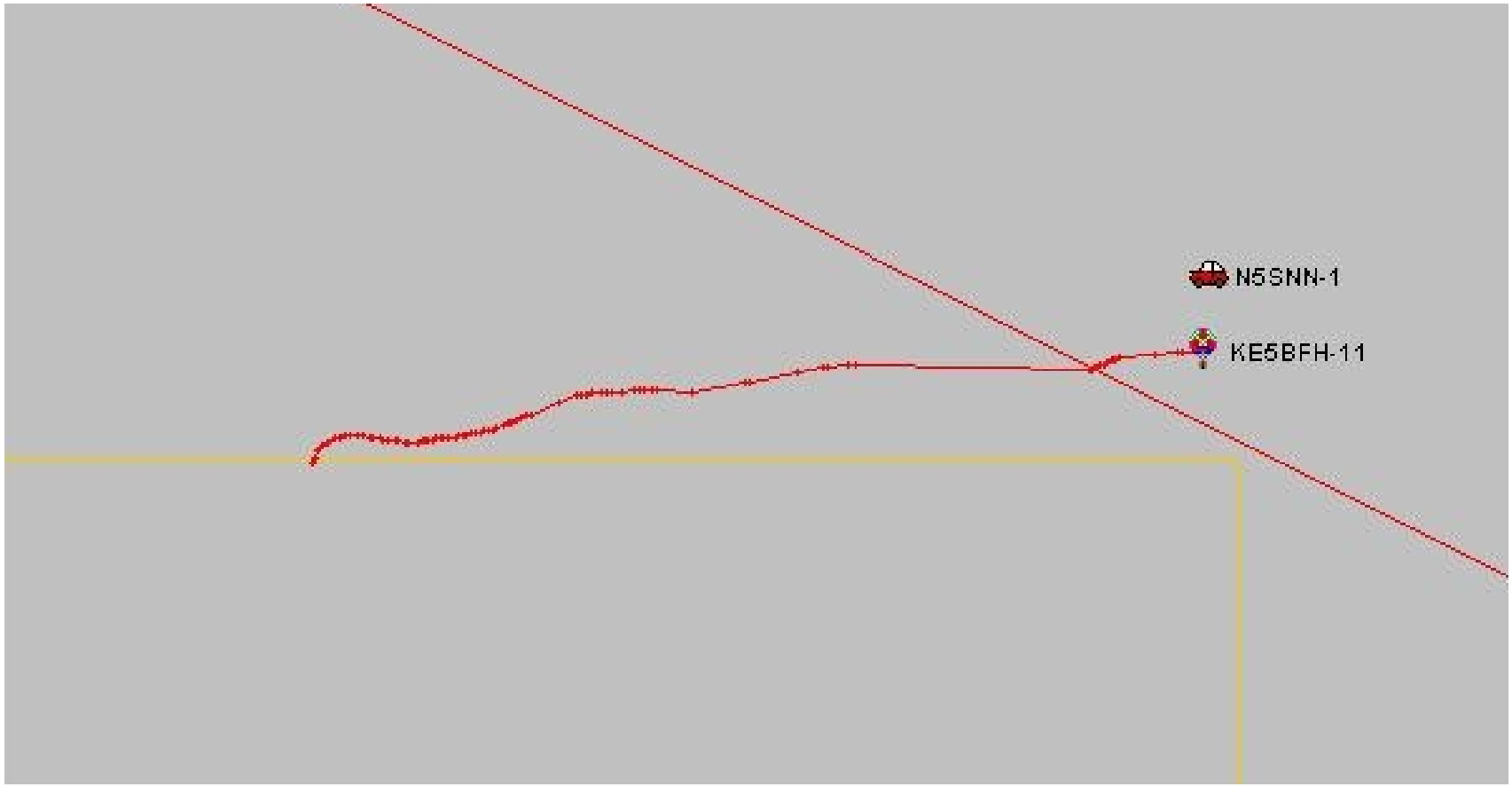
Flying APRS – Lift Off



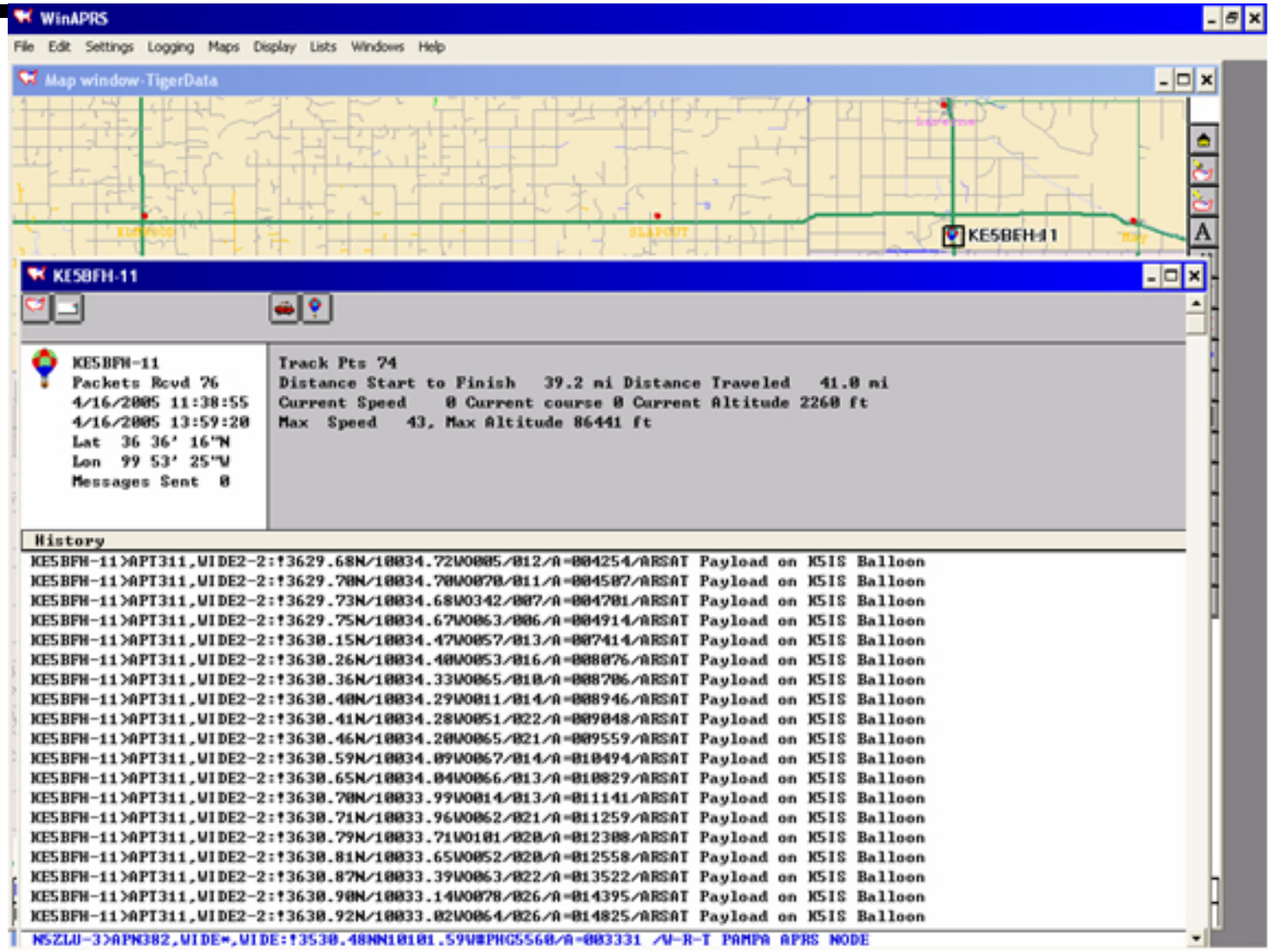


Flying APRS - Penjejakan

Flying APRS - Hunter



Layar APRS


WinAPRS
File Edit Settings Logging Maps Display Lists Windows Help
Map window-TigerData
KE5BFH-11
KE5BFH-11
Packets Rcvd 76
4/16/2005 11:38:55
4/16/2005 13:59:20
Lat 36 36' 16"N
Lon 99 53' 25"W
Messages Sent 0
Track Pts 74
Distance Start to Finish 39.2 mi Distance Traveled 41.0 mi
Current Speed 0 Current course 0 Current Altitude 2260 ft
Max Speed 43, Max Altitude 86441 ft
History
KE5BFH-11>APT311,WIDE2-2:!3629.68N/10034.72W0085/B12/A=004254/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3629.70N/10034.70W0078/B11/A=004507/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3629.73N/10034.68W0342/B07/A=004701/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3629.75N/10034.67W0063/B06/A=004914/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.15N/10034.47W0057/B13/A=007414/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.26N/10034.40W0053/B16/A=008076/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.36N/10034.33W0065/B10/A=008706/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.40N/10034.29W0011/B14/A=008946/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.41N/10034.28W0051/B22/A=009048/ARSAT Payload on KSIS Balloon
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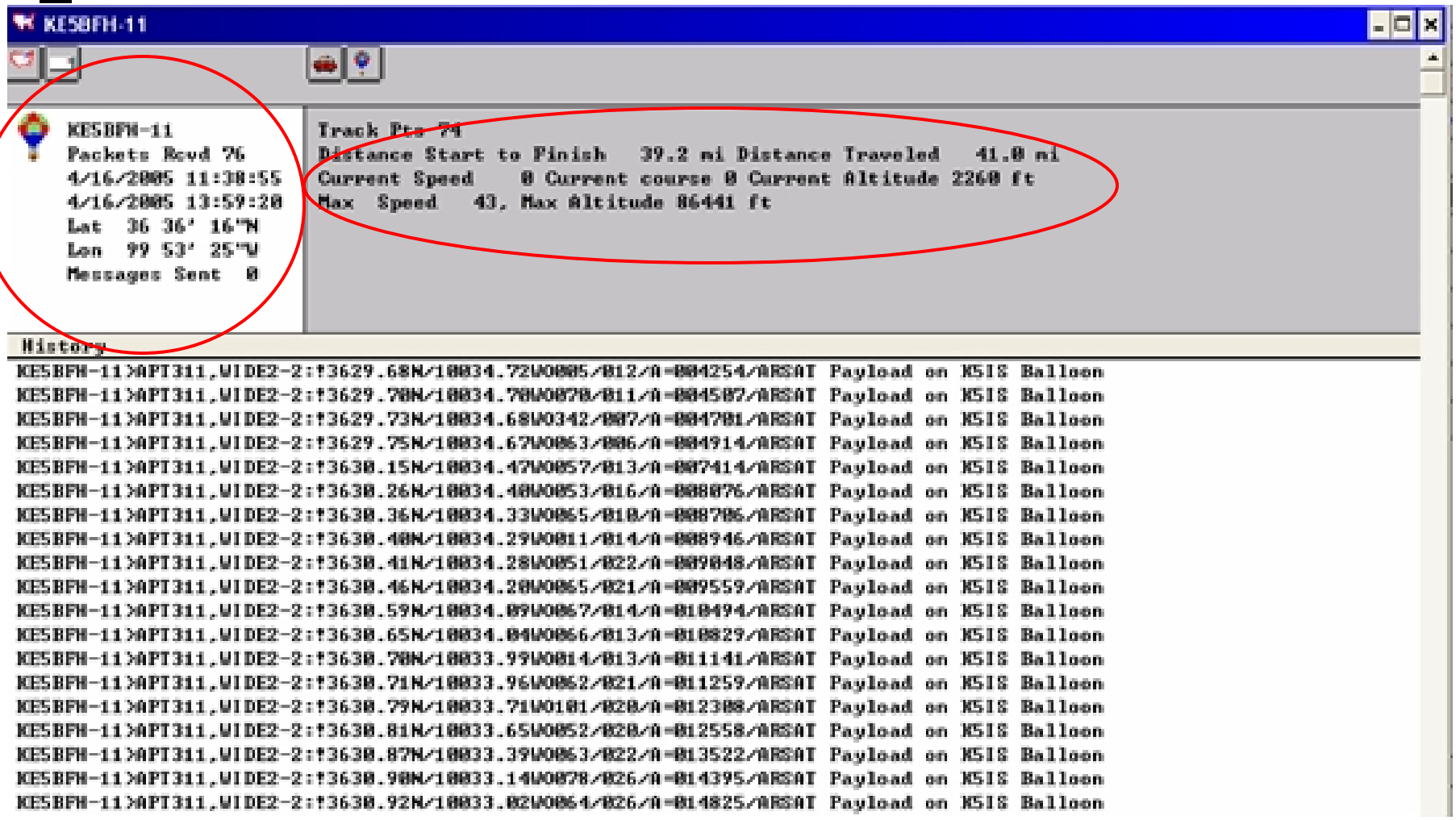
KE5BFH-11>APT311,WIDE2-2:!3630.65N/10034.04W0066/B13/A=010829/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.70N/10033.99W0014/B13/A=011141/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.71N/10033.96W0062/B21/A=011259/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.79N/10033.71W0101/B20/A=012308/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.81N/10033.65W0052/B20/A=012558/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.87N/10033.39W0063/B22/A=013522/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.98N/10033.14W0078/B26/A=014395/ARSAT Payload on KSIS Balloon
KE5BFH-11>APT311,WIDE2-2:!3630.92N/10033.02W0064/B26/A=014825/ARSAT Payload on KSIS Balloon
NSZLU-3>APMI02,WIDE*,WIDE:!3530.48NN10101.59W#PHG5560/A=003331 /W-R-T PAMPA APRS NODE

Flying APRS - Flight Detail



Soundcard TNC

- AGWPE (free)
- AGWPE Pro ($49)
- MixW ($49 after 15 days)
- FlexNet
- DM780 (masih beta)
- Perlu rangkaian sederhana untuk:
  - Isolasi (mencegah hum)
  - PTT

Demo Piranti APRS

- Laptop
  - Hardware: AGWPE soundcard TNC
  - Radio: handheld scanner
  - Software: UI-View
  - GPS: DeLorme USB GPS
  - Map: Gunther Map
- Handheld
  - Radio: Kenwood D7A(G)
  - GPS: Garmin eTrex

Biaya

- Radio — ??? (radio bekas)
- Antena + coax — ???
- Komputer — ???
- TNC — free (soundcard)
- Software
  - AGWPE — free
  - UI-VIEW — free (*donationware*)
  - Map — free (scan dari peta)
- Tracker
  - Tinytrak — $ 30 (kit)
  - OpenTracker — $ 32 (kit)
- GPS — Rp 250rb – 1,1 jt

Catatan Akhir

- Mailing list:
  - Id-aprs@yahoogroups.com
- Gunakan:
  - Antena yang sebaik mungkin
  - Deviasi yang benar (slightly under is better)
- Jangan menggunakan:
  - RELAY, TRACE
  - Antena directional (cegah "*hidden transmitter syndrome*")

Path Forward

- Pelatihan APRS
- Membuat jaringan APRS
  - Beberapa digipeater utk 1 kota
  - Satu iGate per kota
- Pelatihan APRS
  - Merakit piranti
  - Set up
  - debugging
- Membuat APRS trackers siap pakai
  - Untuk SAR
  - Untuk bankom

Pilihan SSID

-0 Home Station, Home Station running IGate.
-1 Digipeater, Wx Digipeater
-2 Digipeater [#2 or] on 70CM
-3 Digipeater [#3]
-4 HF to VHF Gateway
-5 IGate (Not home station)
-6 SatGates & Special function Station.
-7 Kenwood D7 HH
-8 Secondary Mobile station (802.11 in the future)
-9 Primary Mobile station
-10 Internet only stations with no RF equipment
-11 APRS Touch Tone Via EchoLink systems (sometimes *Balloon*)
-12 Portable Units such as Laptops etc.
-14 Trucks
-15 Mobile HF station.

Referensi

- APRS Protocol
  - Info.aprs.net
  - http://www.n5oom.org/2004_hamcom/presentations/Intro_to_APRS.pps
- Tracker
  - http://n1vg.net/opentracker/
  - http://www.byonics.com/tinytrak/
  - http://www.tigertronics.com/gpssuprt.htm
  - http://www.foxdelta.com
- Anti-Tracker
  - http://www.radio-active.net.au/web/tracking/antitracker.html
  - http://www.qsl.net/kc2elo/antitrack.htm
- Penjejakan
  - http://almostangels.org/balloons/