Spiral Development in Wartime

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The Problem

- Can anyone tell me what you just saw?
- Machines understand coordinates – Humans understand maps and imagery
- The “Soda Straw” effect – Great view of the target, no idea what’s off to the side
- Profound need for Situational Awareness (SA) tool to help understand where the heck Predator is, and what the heck they’re doing

Predator Data

The Predator You See…

The Predator You Don't

Ta+3637444To-11528023Tw891Sr3.714.99Se-22.34Fv1.71Sl11014Sa+3639111So-11531557Sn2Cd20000823Ct175544Ir-0.95Ip-0.31Ih173.38Ic0Mn23Md0Mt0Cl0Pc0Iv0

Ta+385To-11536024Tw8983Sr5.47Sp218.64Se-14.95Fv11.55Sl11024Sa+3639065So-11531546Sn2Cd20000823Ct175548Ip-0.33Ih173.73Ic0Mn23Md0Mt0Cl0Pc0Iv0

Ta+3634595To-11536021Tw85.43Sp218.99Se-15v11.55Sl11028S39029So-11531539Sn2Cd20000823Ct175550Ir-0.34Ip-0.58Ih173.50Ic0Mn23Md0Pc0Iv0

Ta+3634577To-11536010Tw8r5.40Sp24Se-15.155Sl11033638582So-11531529Sn2Cd20000823Ct175554Ir-0.37Ip-0.87Ih173.66Ic0Mn23Md0Mt0Cl0Pc0Iv0

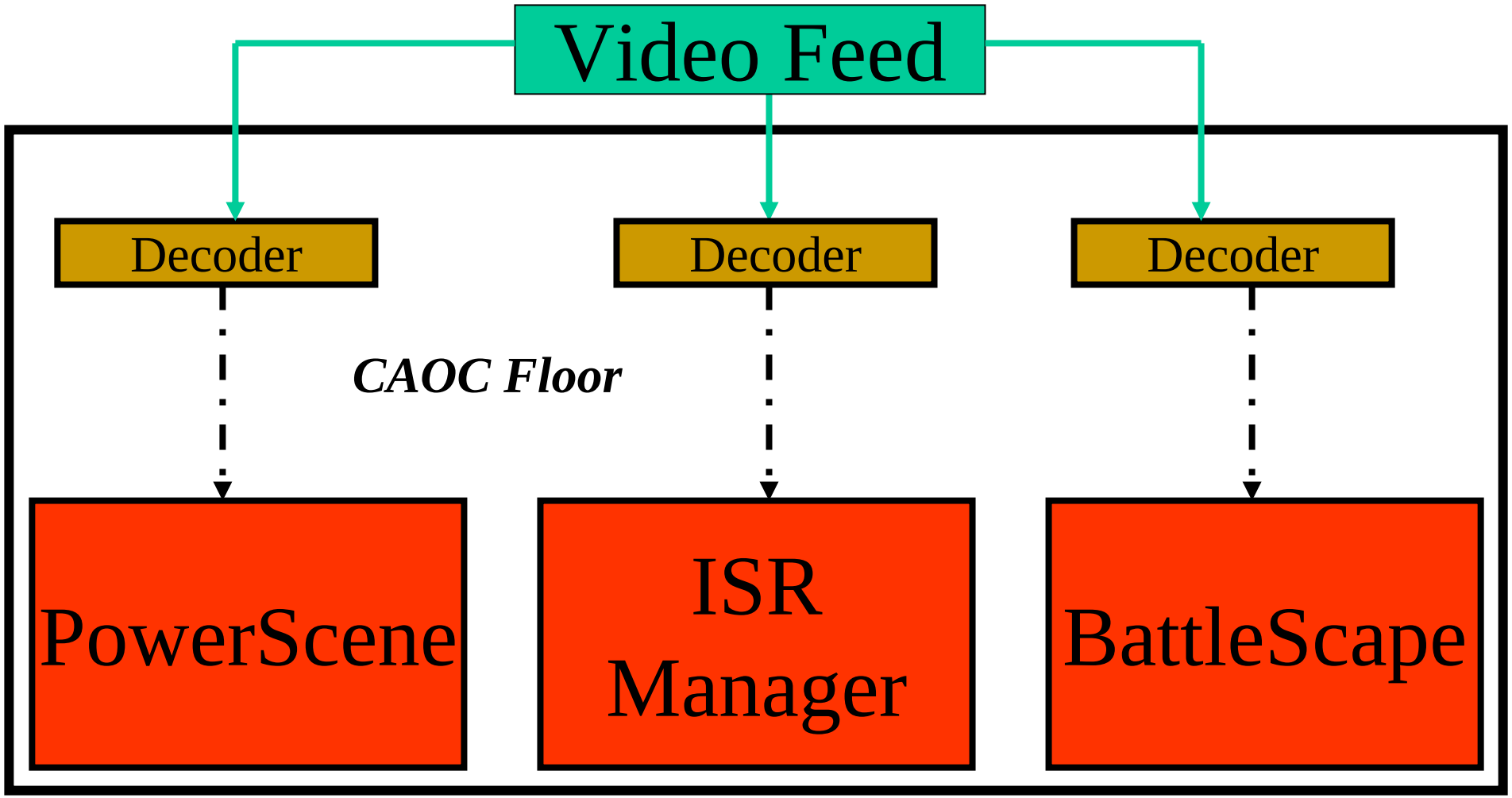
ESD

(Exploitation Support Data)

Exploitation Support Data

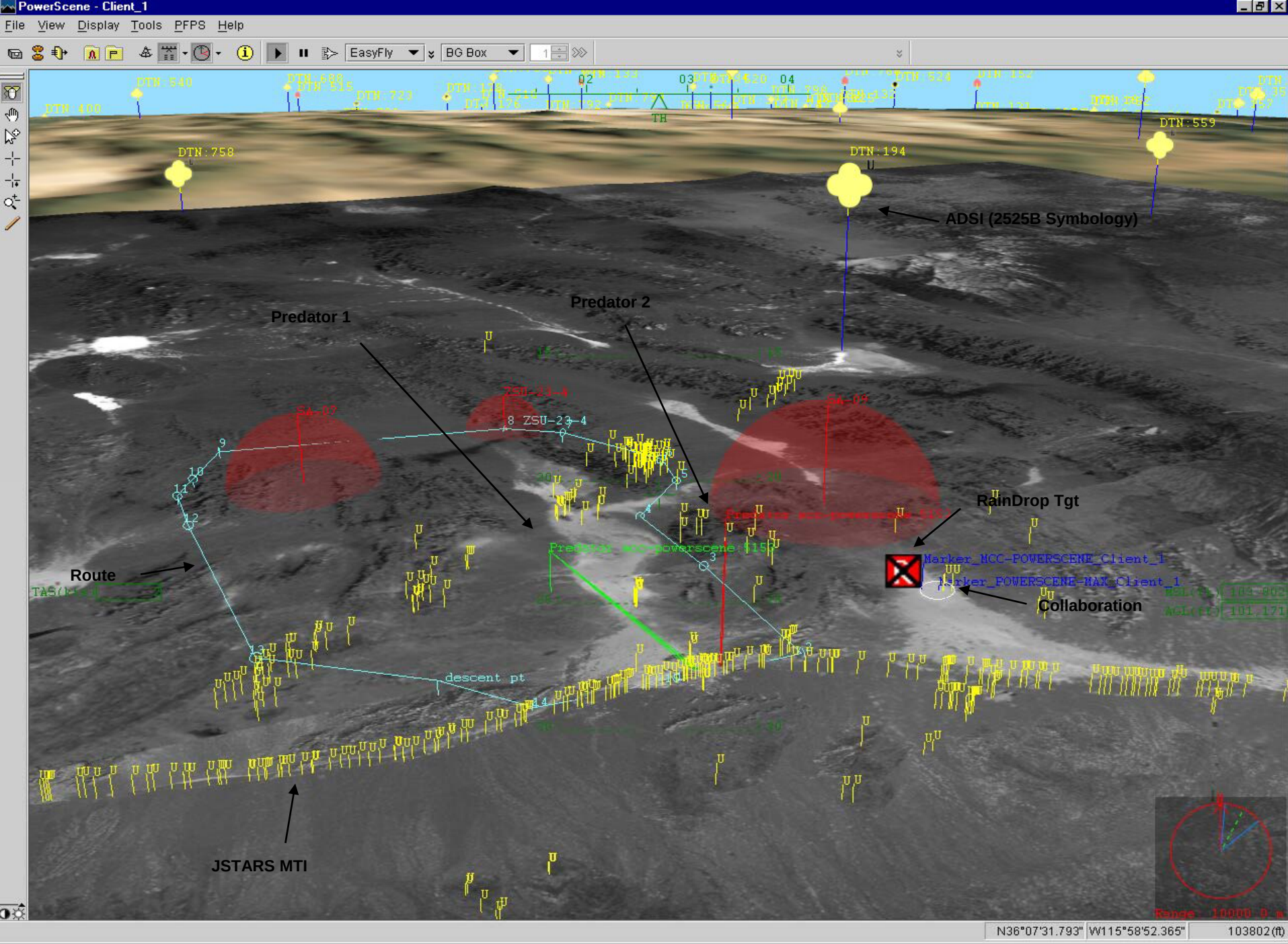
- Developed “on the back of a napkin” during Operation Allied Force (Kosovo)
- Encodes aircraft and Sensor Point of Interest (SPI) coords, elevation, Field of View (FOV) etc.
- Transmitted at low data rate embedded in the NTSC “teletext” field; teletext rides in the blanking interval along with closed captioning

Data Architecture - 2001



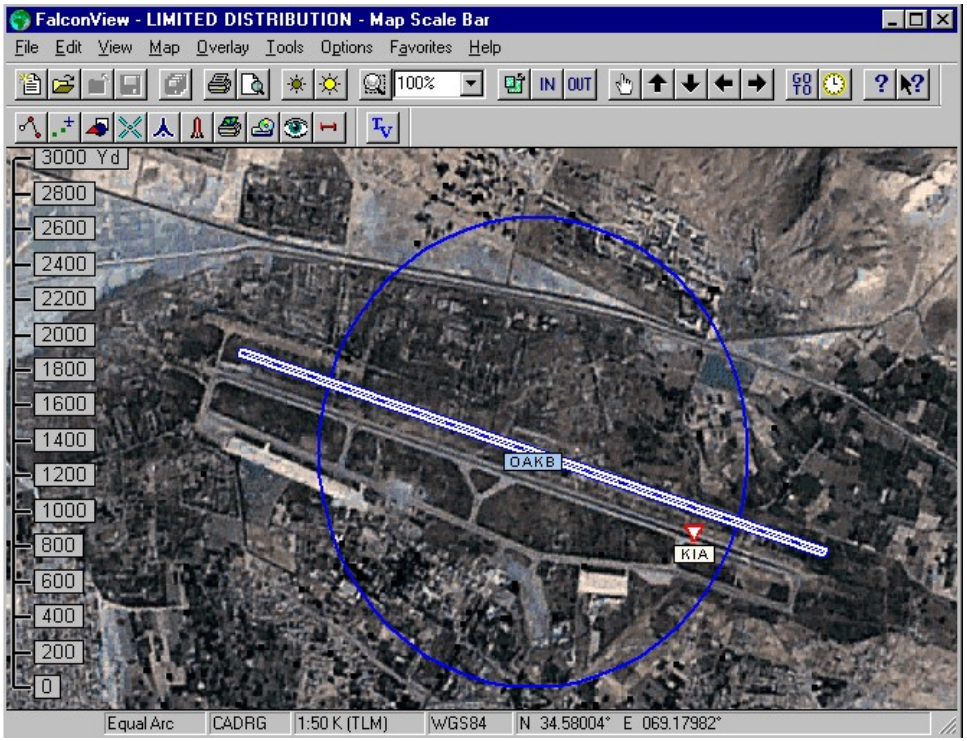
Data Architecture 2001

- “Stovepipe” decoding, individual decoders for each individual computer displaying position
- One or two decoders – no ability to display any more Predators than that
- Decoders not secured – flashing lights and little buttons lead to “little fingers” screwing things up
- Predator position only displayed on the “Machine in the corner” – information is not in front of the people who need it in a tool that they know how to use


PowerScene - Client_1
File View Display Tools PFPS Help
EasyFly
BG Box
DTN:758
DTN:194
DTN:559
ADSI (2525B Symbology)
Predator 1
Predator 2
RainDrop Tgt
Route
Collaboration
JSTARS MTI
descent pt
Marker_MCC-POWERSCENE_Client_1
Marker_POWERSCENE-MAX_Client_1
N36°07'31.793"
W115°58'52.365"
103802(ft)

Spiral 0 – “Predator View”

- Specialized version of PowerScene
- 3D view of battlefield using imagery draped on top of terrain
- Fails to answer fundamental questions: “Where’s the Predator? What’s it looking at?”
- Unfamiliar software, heavy “man in the loop”
- Stovepipe solution – Predator position displayed on one or two PC’s in the CAOC



22,000 copies across all four services and 25 Allied Nations. The de facto "Common Operating Picture"

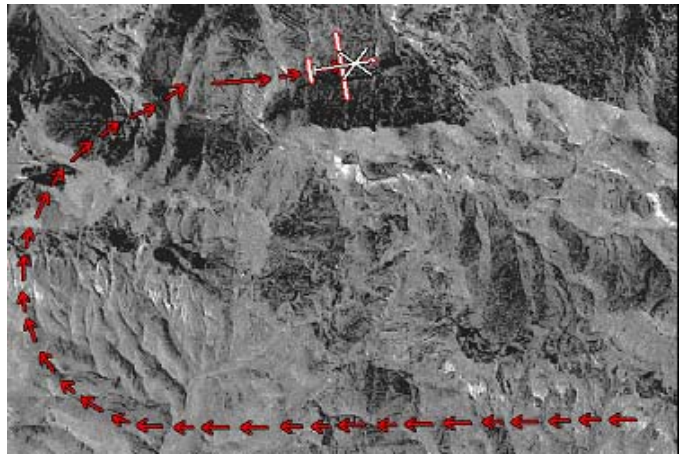
FalconView "GPS" Interface

- FalconView has always had ability to display standard GPS feed as moving map
- FalconView 3.2 added PLGR feed and broke out feeds into separate dynamic link libraries
- New ability to add additional "GPS" types to already fielded versions of FalconView
- AFCSO initiative to add feed to FalconView to act as 2D companion to 3D PowerScene

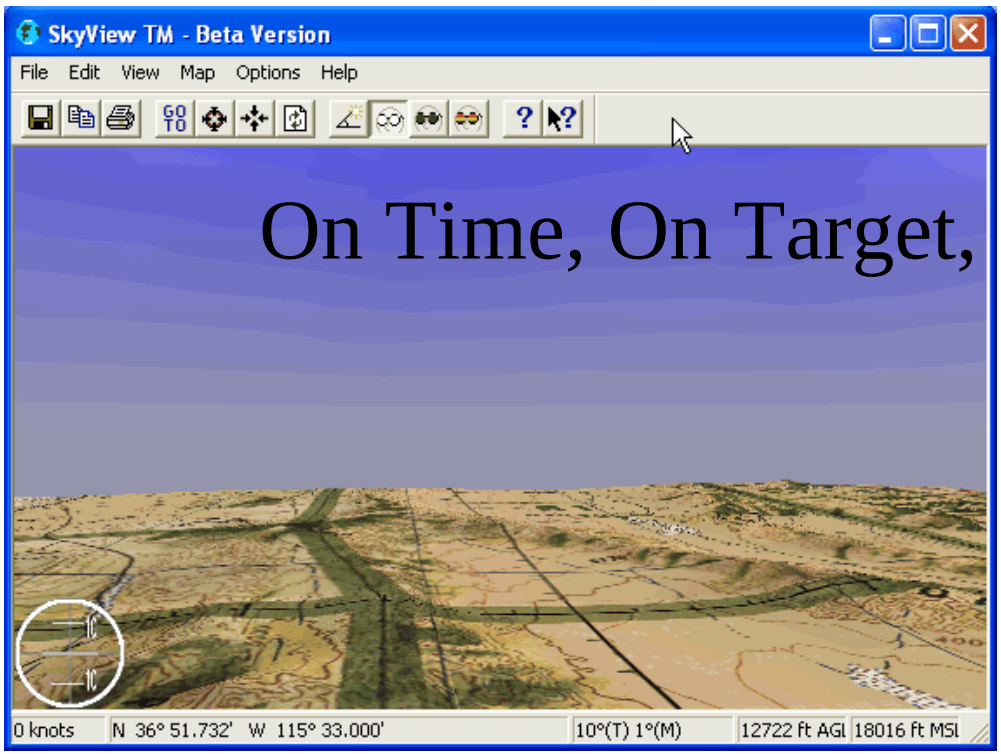
Spiral 1 – July 2002

- First connection between Predator ESD and FalconView
- Uses existing GPS feed mechanism/interface
- Ability to display a single Position (aircraft or SPI) from a single Predator

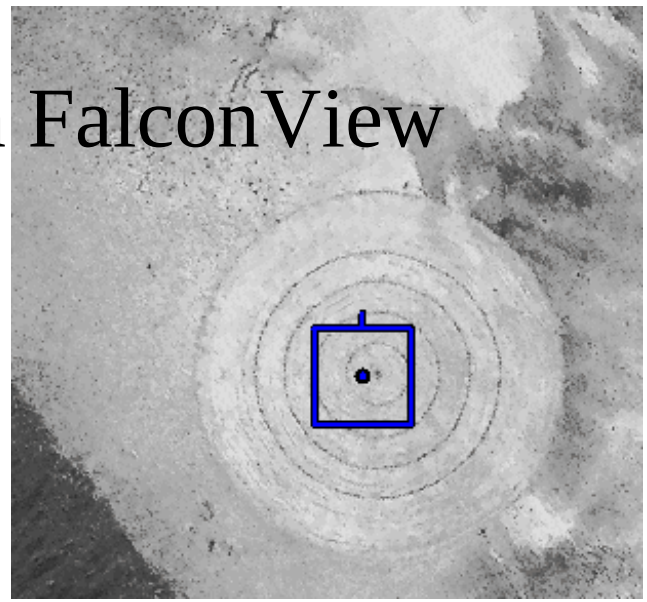
Slides From July 2002



Predator Feed for FalconView



On Time, On Target, On FalconView

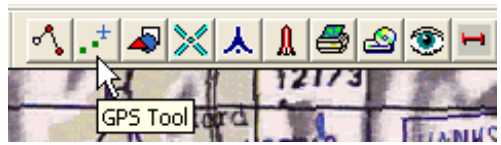


What is the Predator Feed?

- Installable dll file (64kb) that works with FalconView 3.2 (or greater)
- Uses existing Moving Map Functionality
- Follow Sensor FOV Centerpoint or UAV Location
- Uses “ESD” Predator Position Feed to Serial Port provided by data recovery device to pull data from closed captions

How Do I start the Feed?

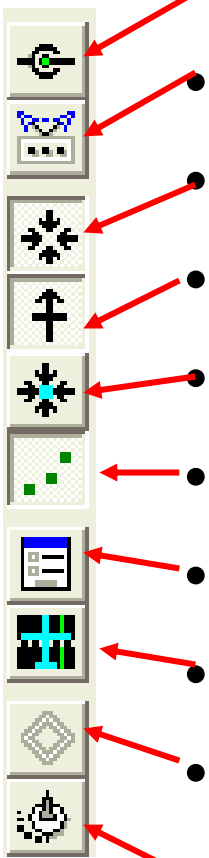
- Start FalconView GPS Tool



- Click Connect Button

- Or…Just press “CTRL-Q”and FalconView will do everything

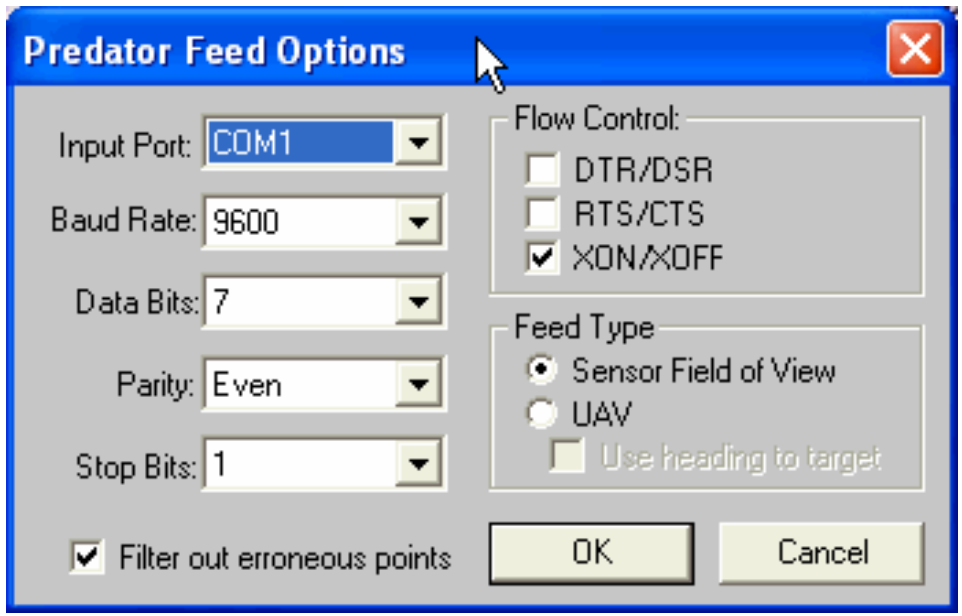
Moving Map Toolbar



- Connect/Disconnect
- Predator Feed Options
- Auto Center on Predator Position
- Orient chart to match UAV Course / FOV Orientation
- Smooth Scrolling
- Turn On/Off Trail Points (breadcrumbs)
- GPS Options
- Course Displacement Indicator (CDI)
- Display Range and Bearing
- Coast Track to dead recon position of Boogie

Predator Options Dialog Window

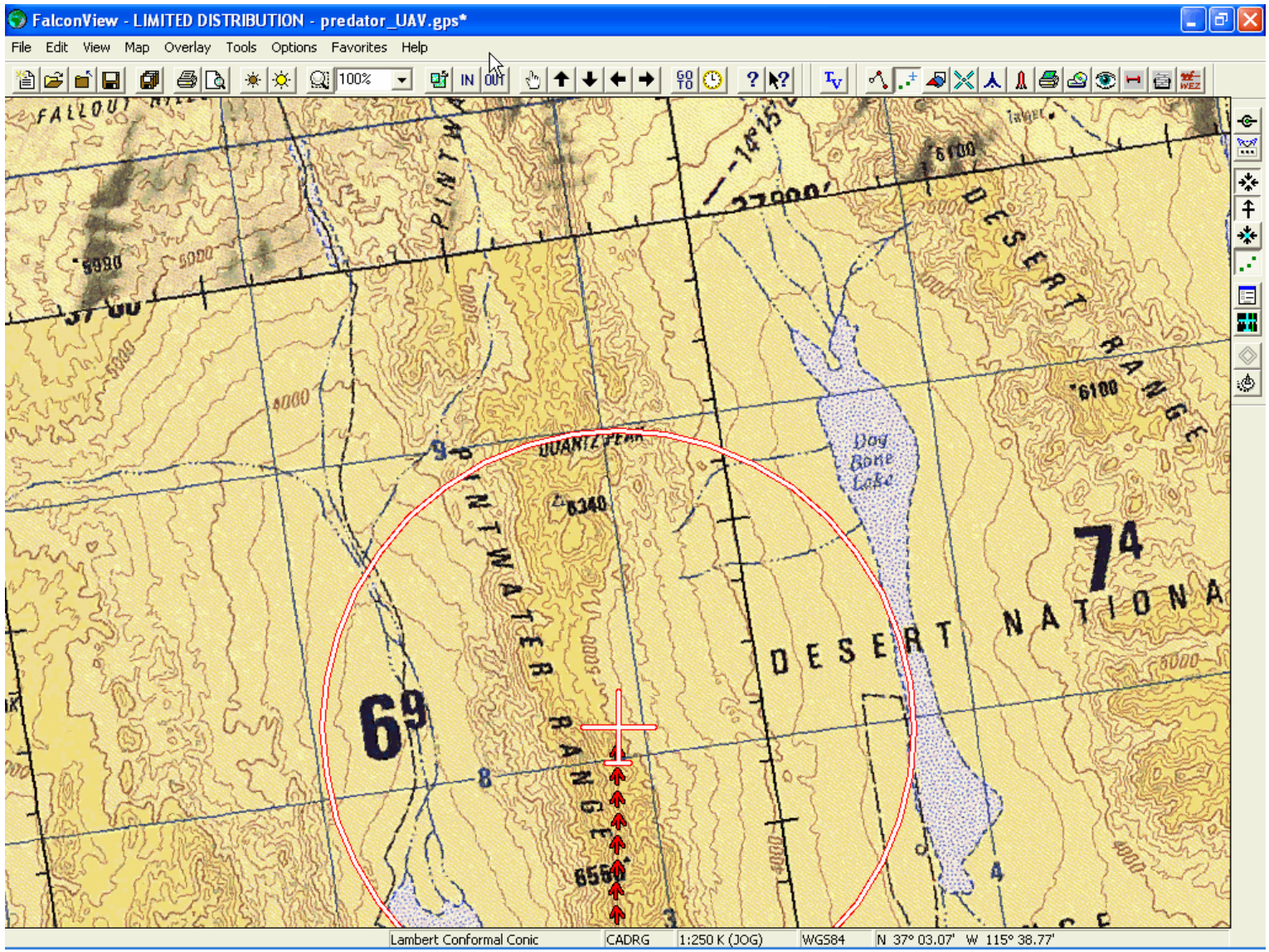
- If the feed works once then the only thing you should change is the “Feed Type” to switch between the UAV and the Sensor FOV!



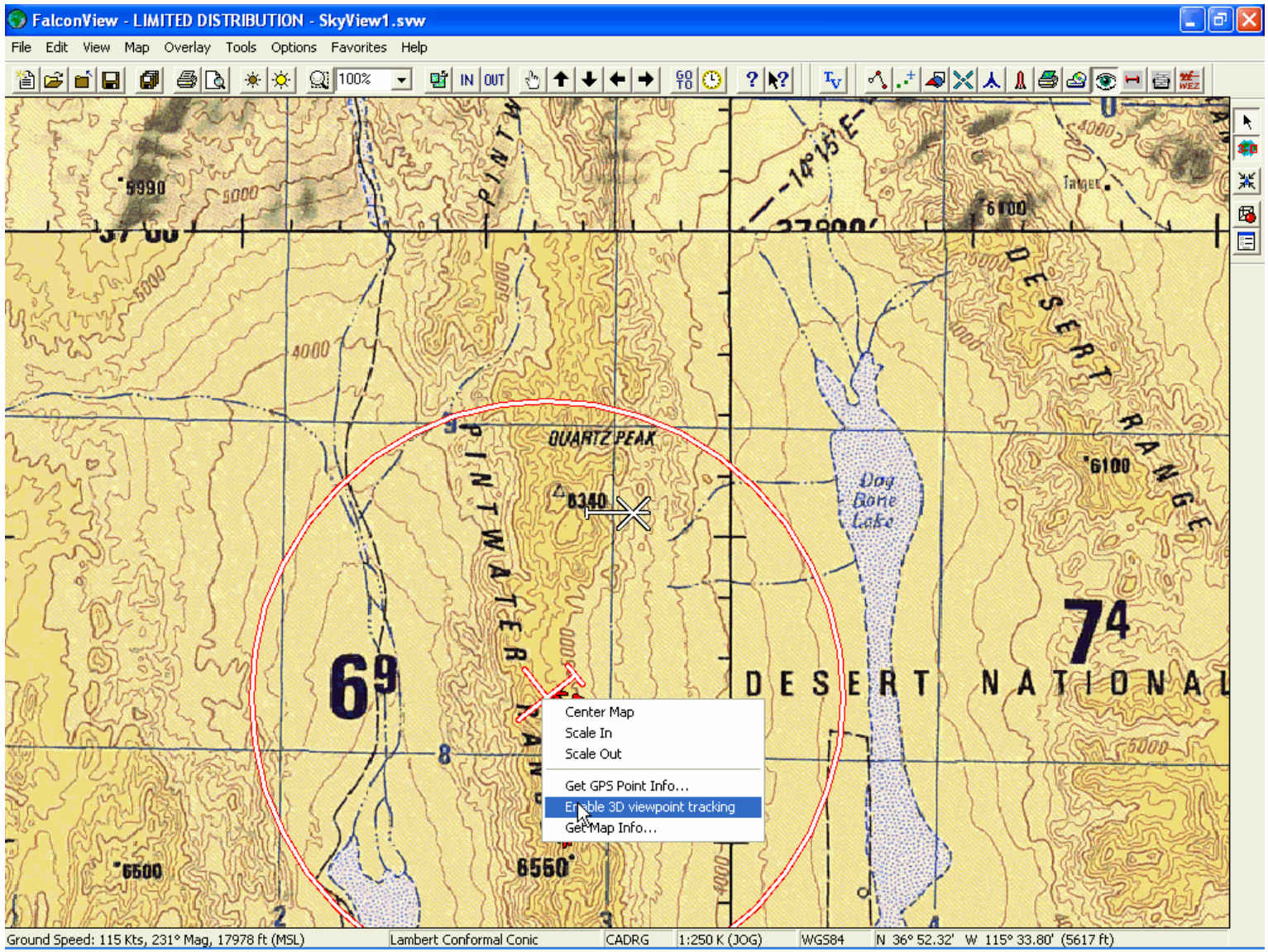
Note: This is the only piece that is “Predator Unique”. Everything else is built into FalconView 3.2 and paid for by someone else

Sensor FOV on 5M CIB

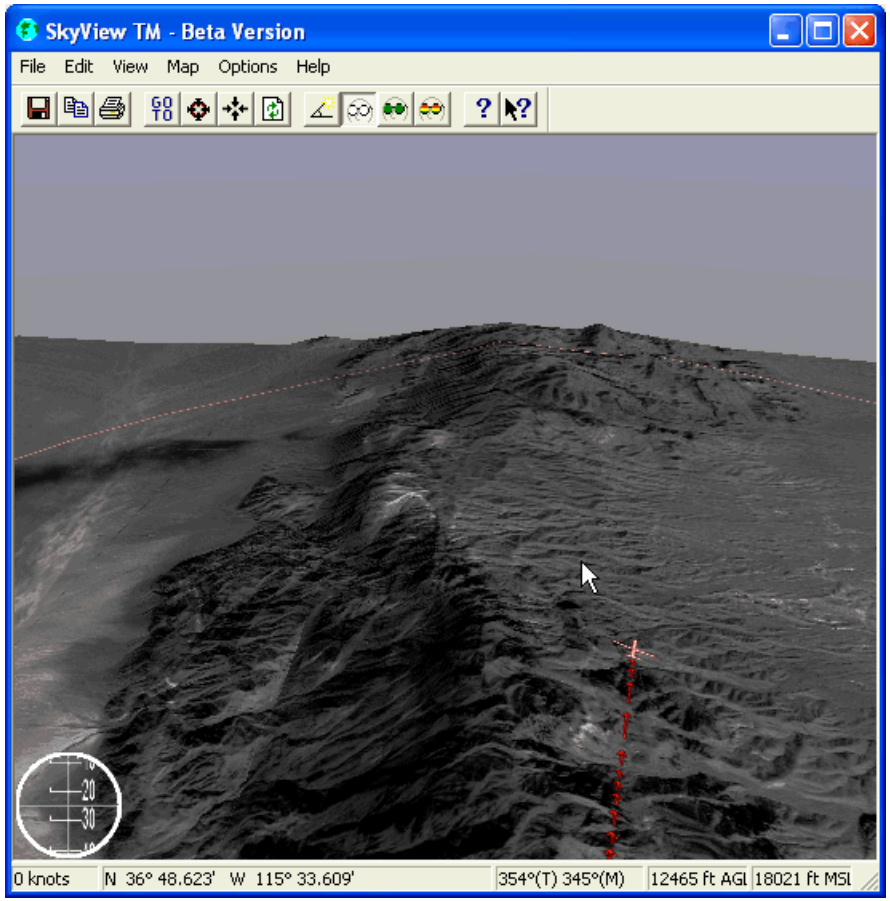
Predator Position on JOG

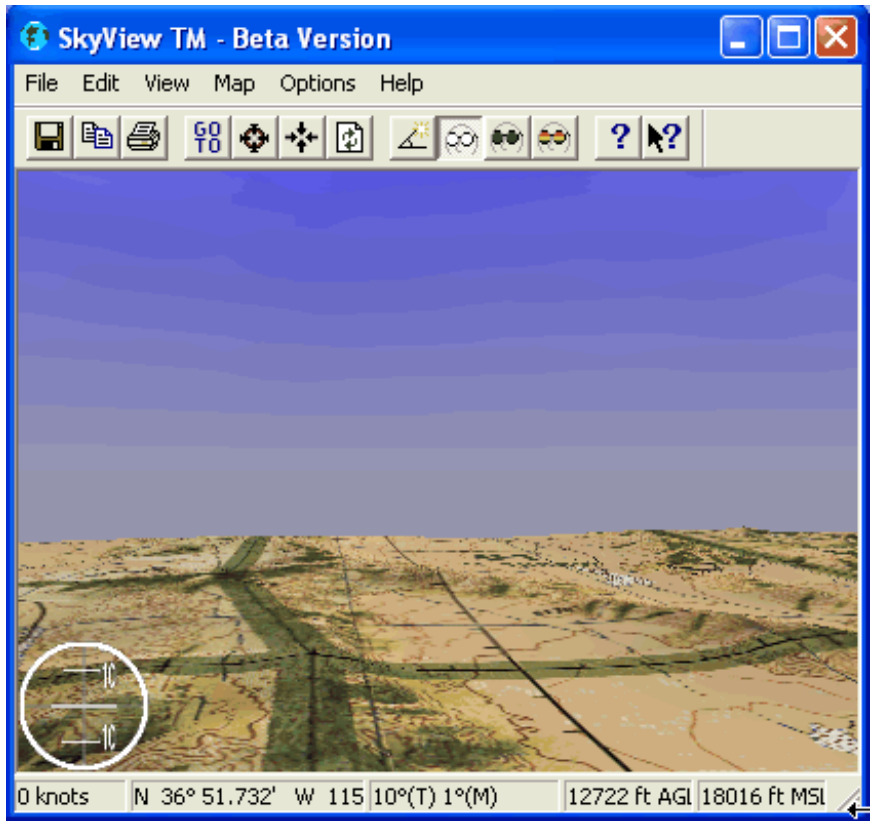


Tying SkyView to Predator



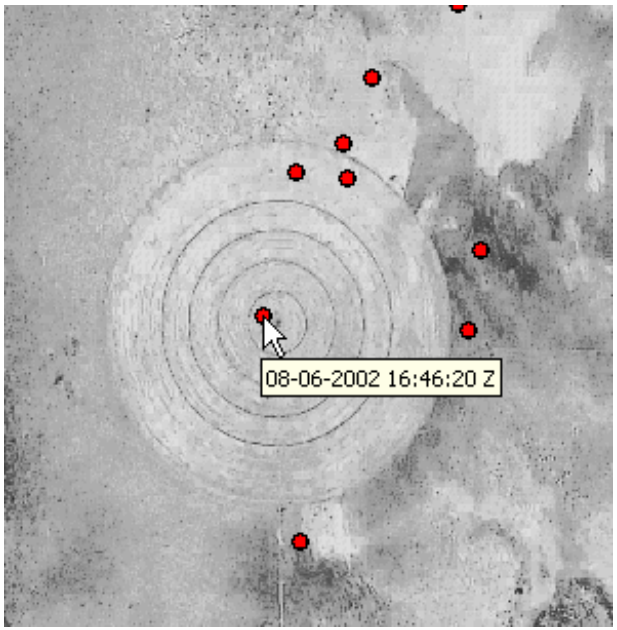
Predator/SkyView

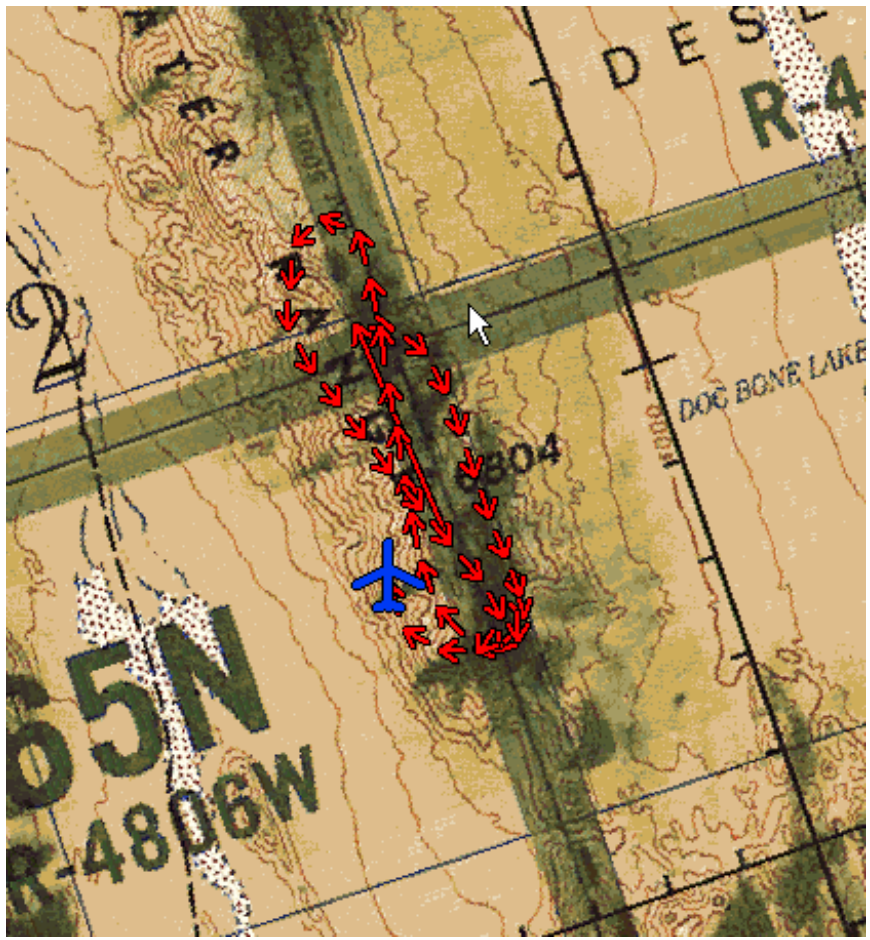




Recording Missions

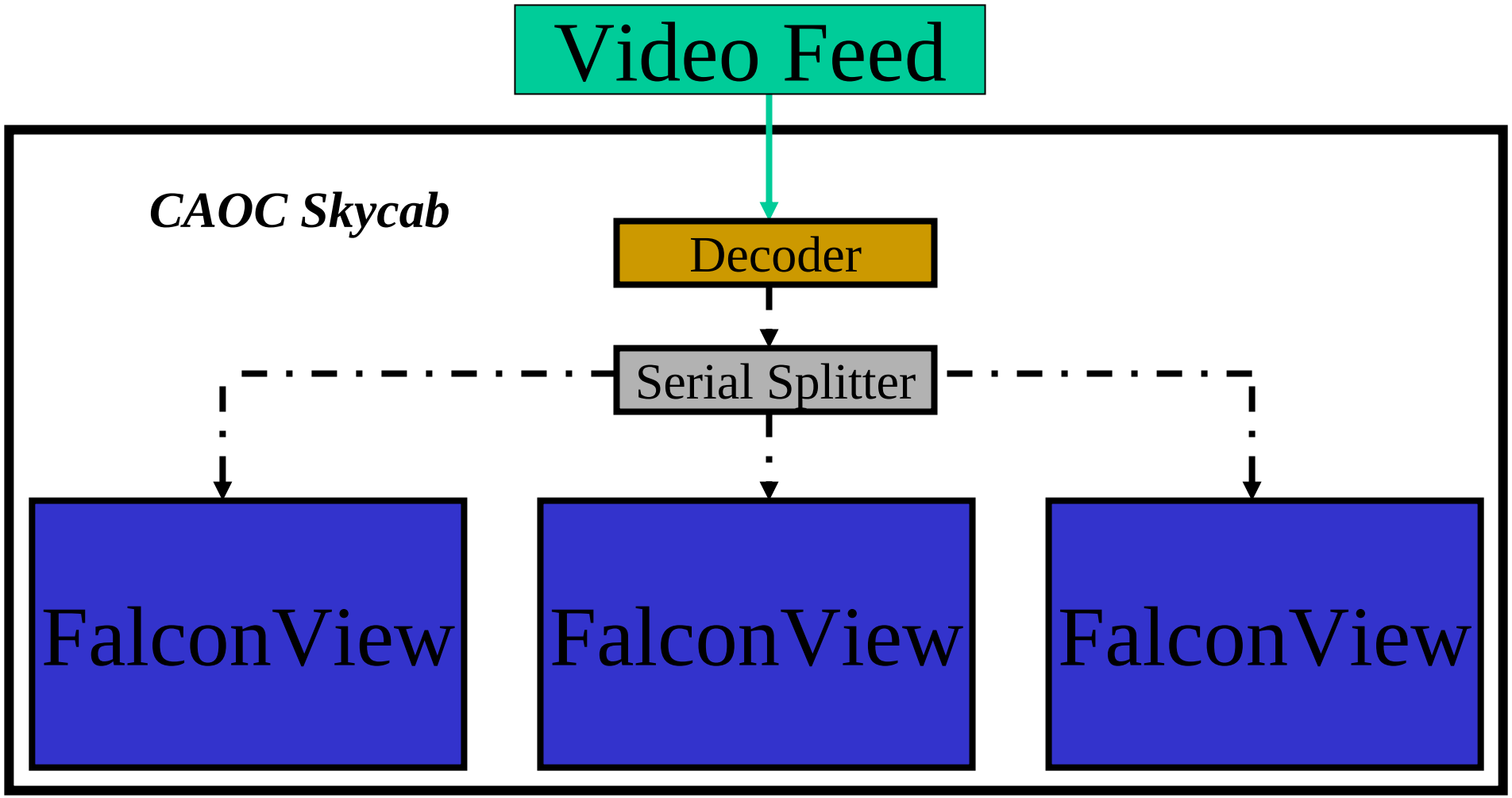
FalconView Records Mission in Track file that can be reviewed / replayed at any time





Back to today…

Data Architecture - July

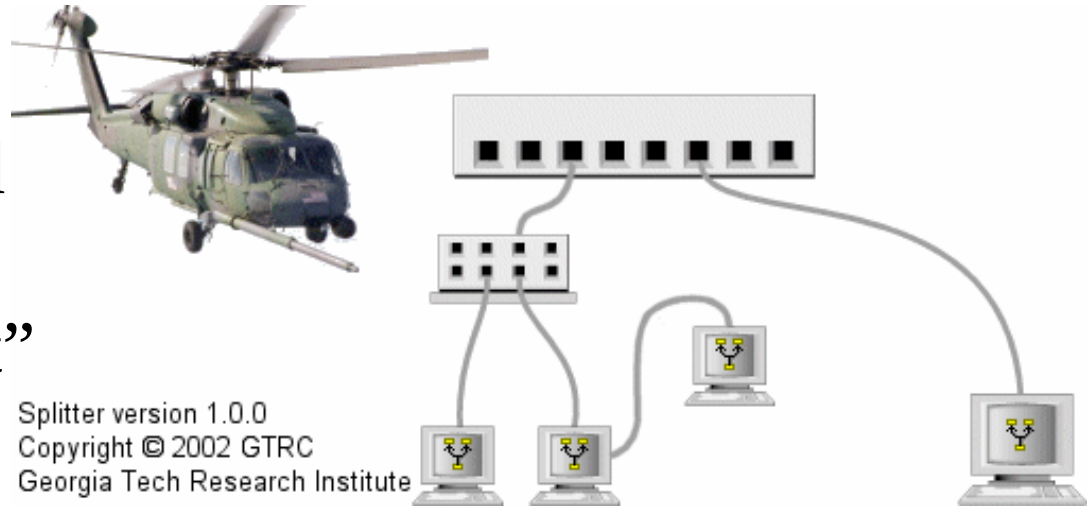


Spiral 1 Shortfalls

- Need to run serial cable to each individual PC where you want to display Predator Position
- Different floor areas require separate decoders
- FalconView can only display a single position at a time, need to manually swap video cables to switch between different aircraft/feeds

HH-60 “Splitter” Program

- Program to take intertwined GPS and NRT Intel feed on a serial port and “Split” into two separate TCP/IP feeds



- Also had intrinsic ability to take any serial feed and translate into TCP/IP to broadcast across the network
- Also developed “Network NMEA” feed to receive GPS feed across a network

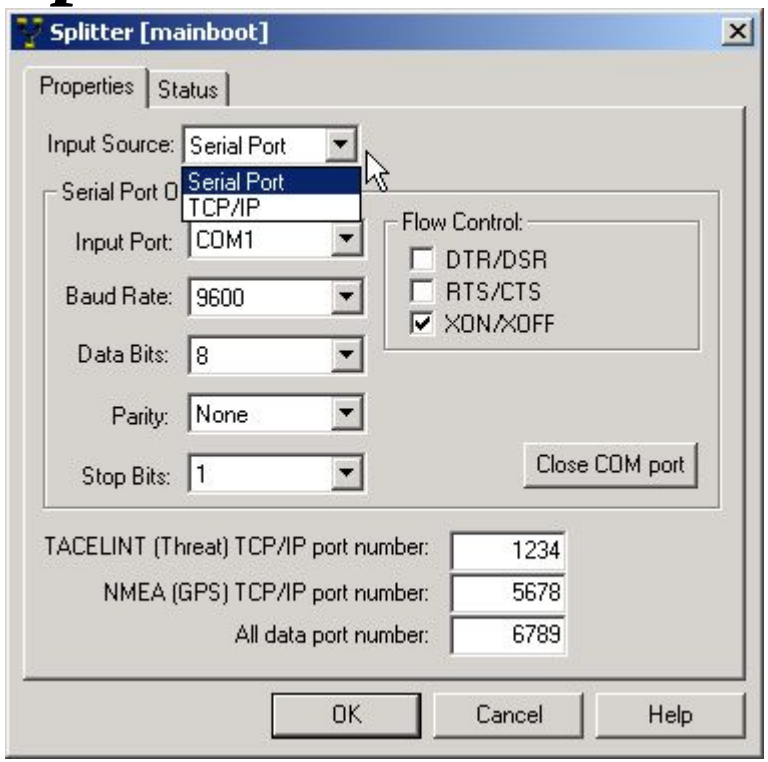
Spiral 2 – December 2002

- Leverage HH-60 Splitter program to broadcast ESD across a network

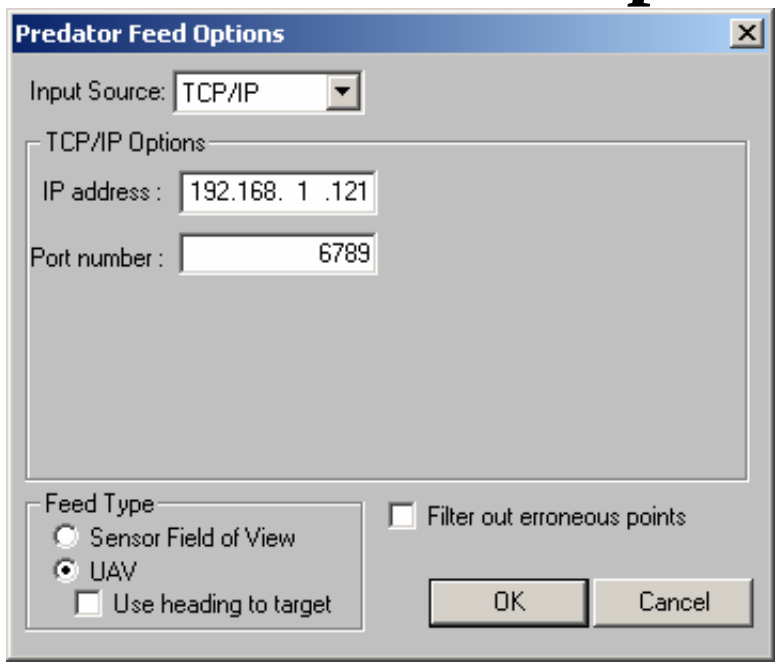
- Modify FalconView Predator feed to support TCP/IP feeds as well as existing Serial feed
- Relocate teletext decoders from CAOC floor (under Predator LNO's desk) to secure area

Spiral 1 New Features

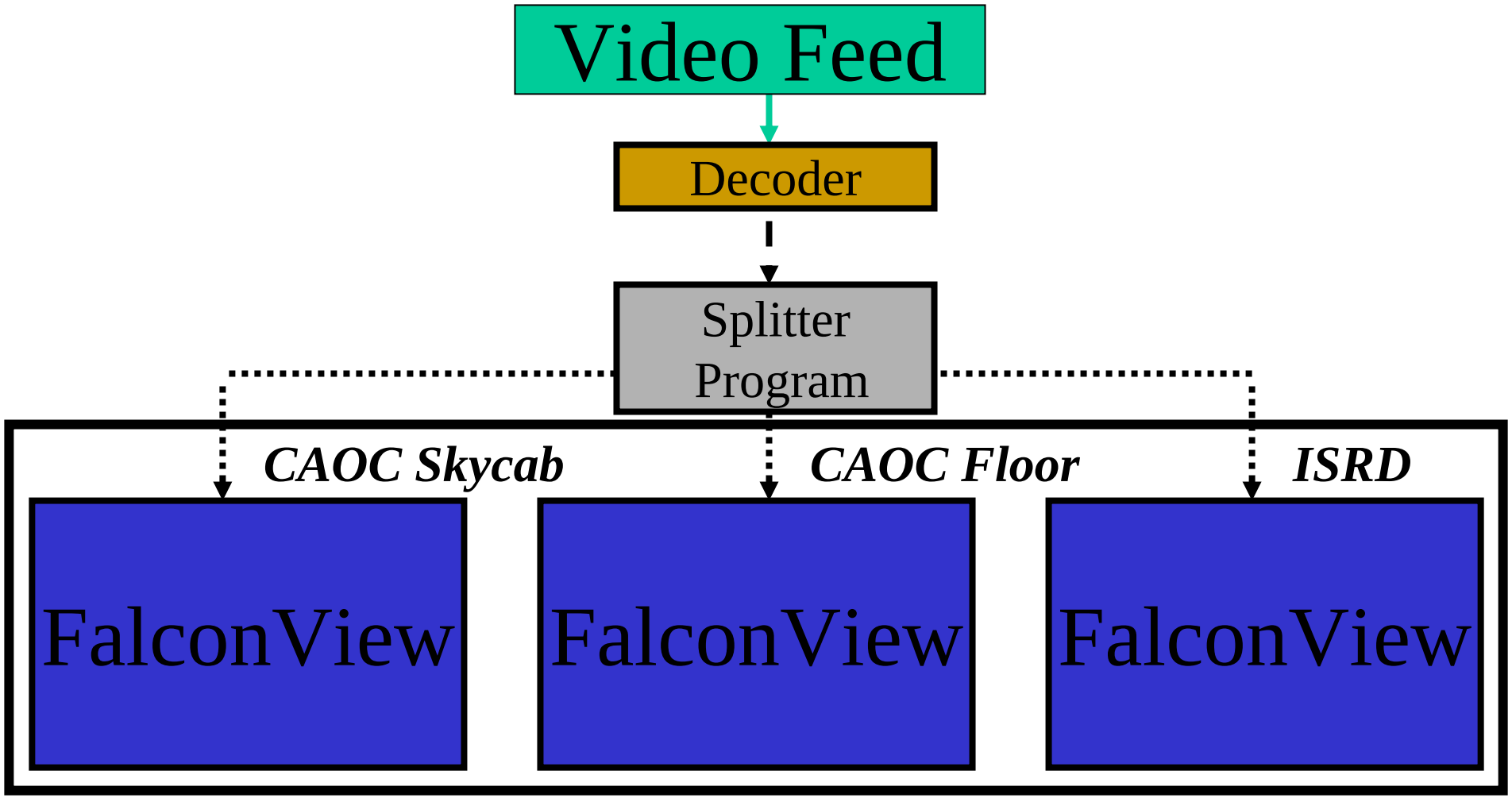
Splitter



New Pred Feed Options



Data Architecture - December



Spiral 2 Shortfalls

- FalconView can only display a single position at a time, need to swap TCP/IP input settings to switch between different aircraft/feeds
- Concern about “how much bandwidth is this using?”
- Growing awareness that there soon will be many more Predators

Spiral 3 – February 2003

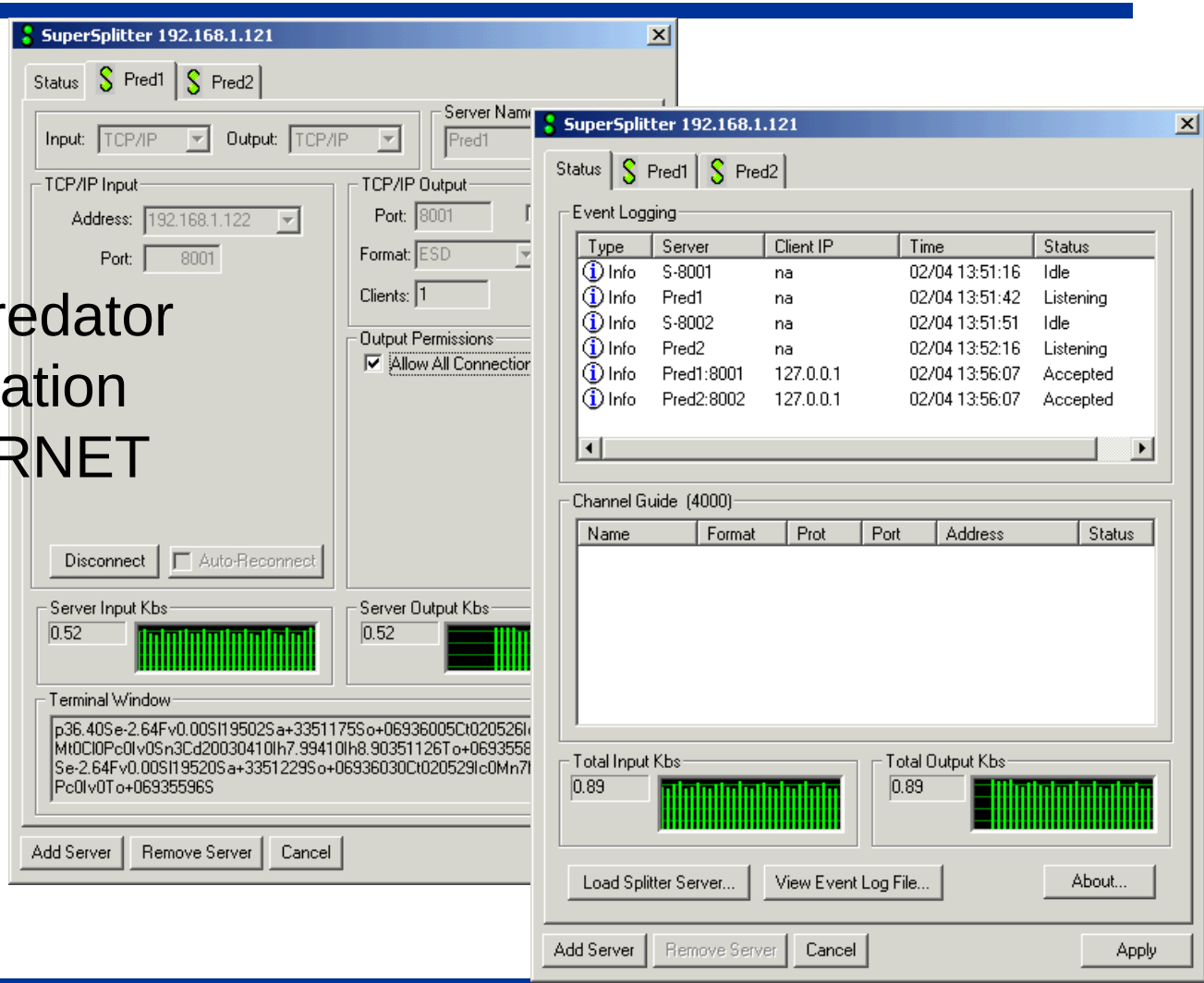
- Driven by input from Predator Community
- Add “MultiPredator” Tool to display both vehicle and SPI for multiple Predators

- Add SuperSplitter to translate serial to TCP/IP for multiple ESD (or anything else) feeds
- Add “Raindrop Launcher” to pass coordinates from FalconView to NG’s Raindrop point mensuration tool using “Machine to Machine interface

FV TST Enhancements

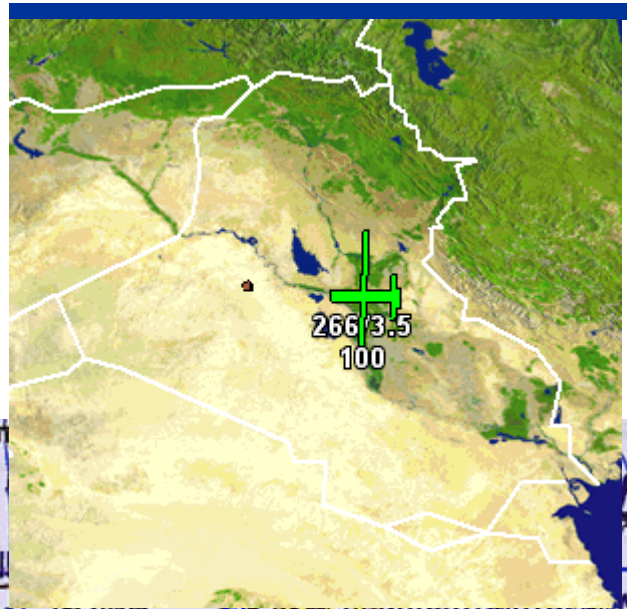
Super Splitter

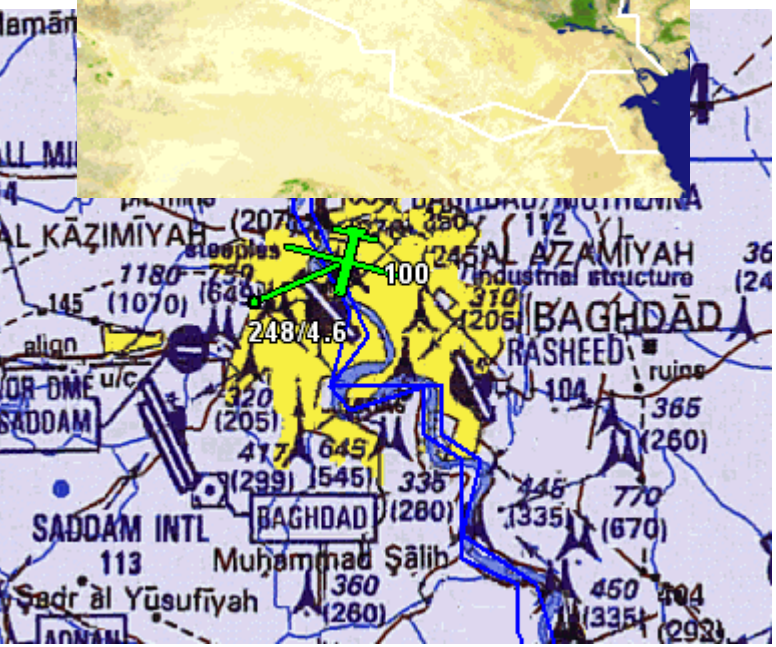
Transmitting Predator Position Information across the SIPRNET

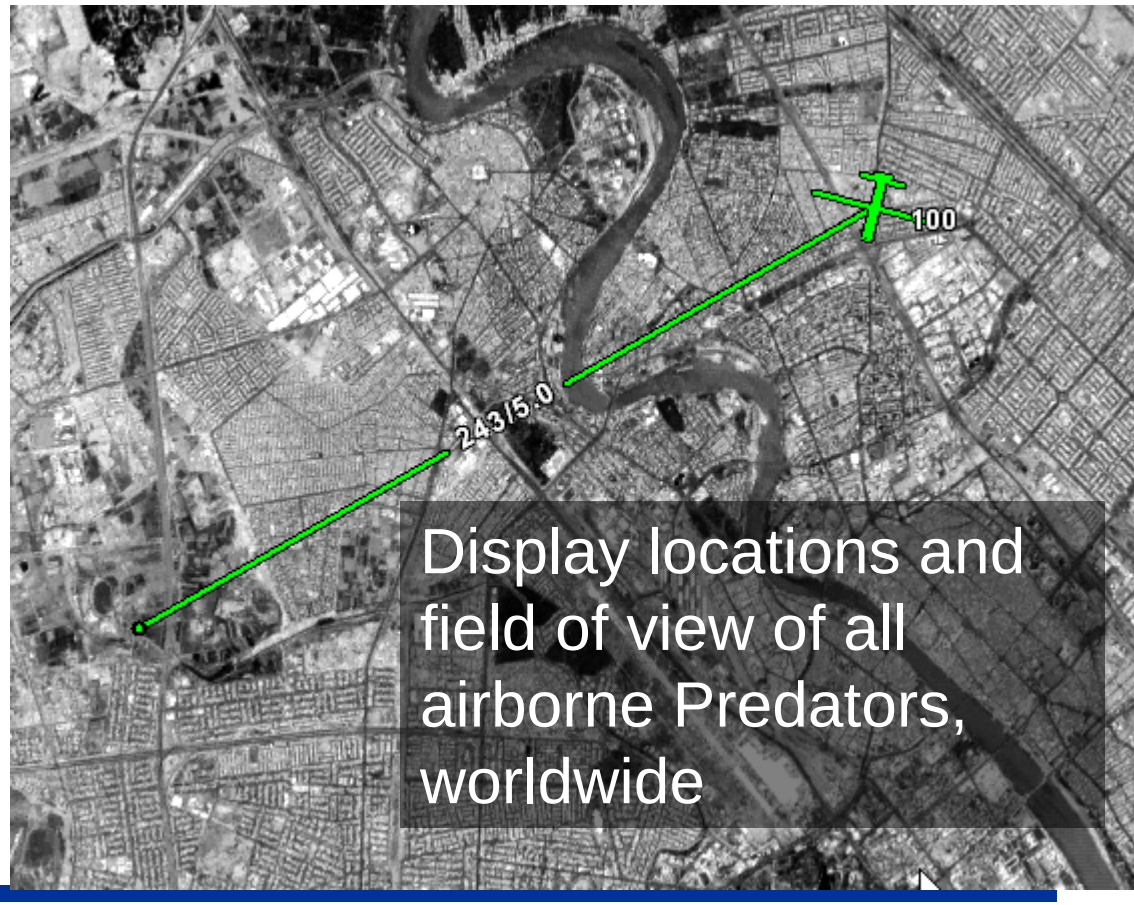


FV TST Enhancements

MultiPredator Tool





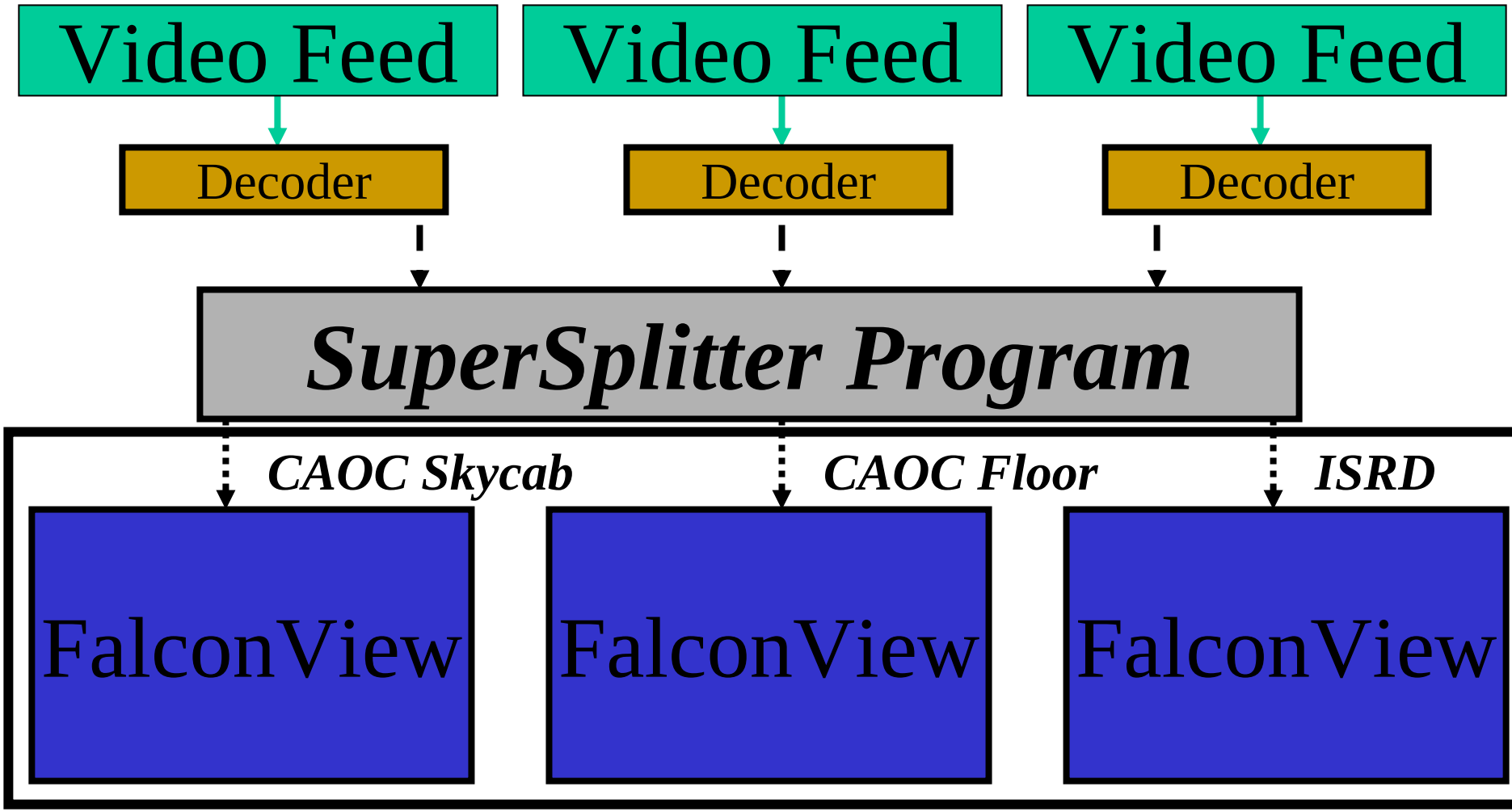


Display locations and field of view of all airborne Predators, worldwide

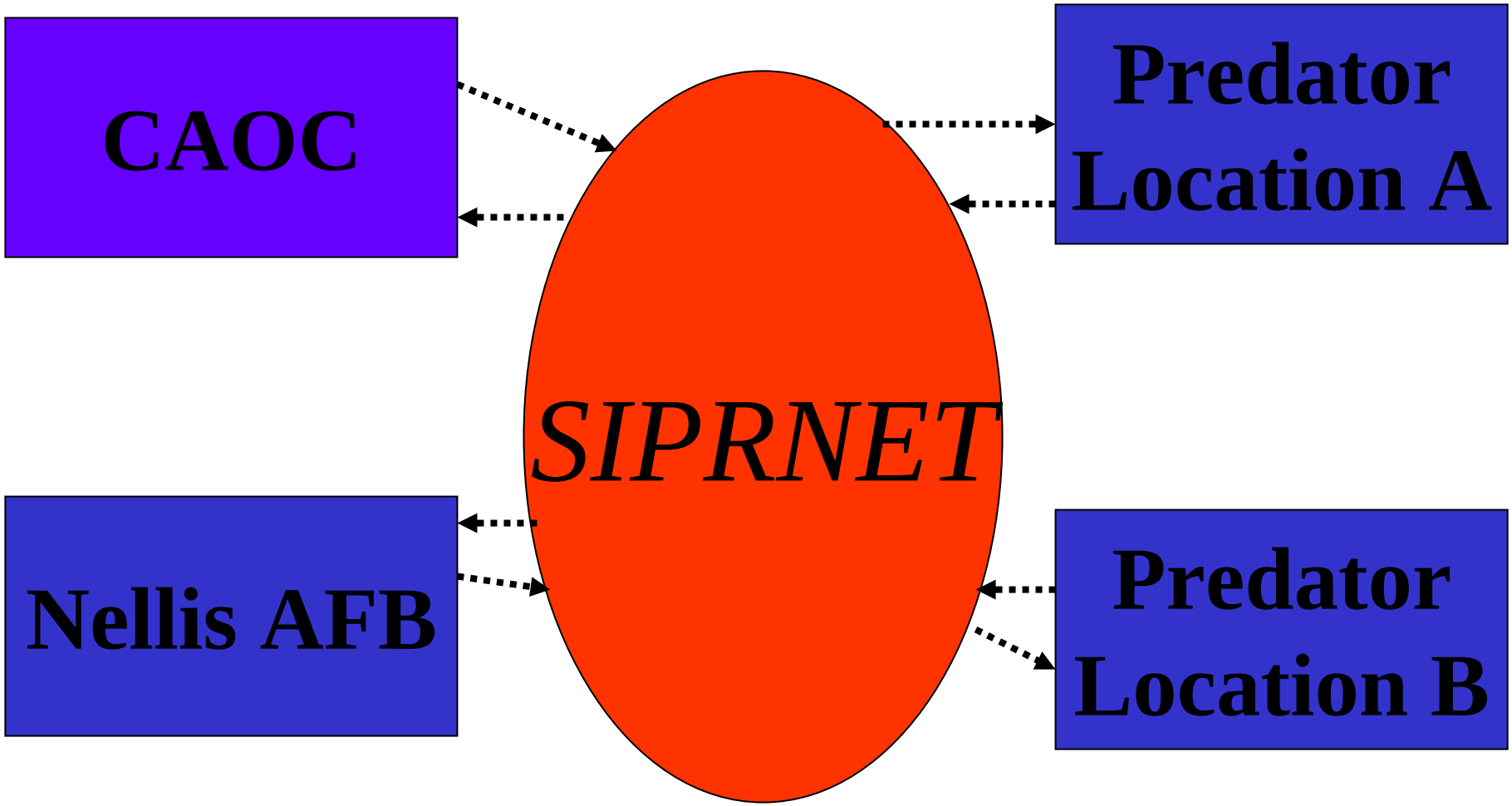
FV TST Enhancements

RainDrop Launcher – Machine to Machine Interface (M2MT) from FalconView to RainDrop Mensuration Tool

Data Architecture – Feb 2003



Data Architecture Continued



Current Status – Today!

- Spiral 2 (Predator “GPS” feed) being fielded across DoD as part of PFPS 3.3.1
- Spiral 3 (MultiPred Tool)in use throughout the Predator community, GCS, Ops Cell, CAOC, Exploitation Cell, Fwd Locations etc.
- Additional applications beginning to connect to ESD TCP/IP stream from SuperSplitter
- Spiral 4 integrated into PFPS 4.0 (in test)

"Real World" Spiral Development

- In Wartime you've got everything *but* time
- Need to rapidly develop and field a solution, even if it isn't perfect
- Field an 80% solution or even a 50% solution until you can get feedback and determine what people really need
- If "spiraling" is just justification for continued funding it isn't spiral development at all

Lessons Learned

1. Listen to your customers
2. Just because it looks good in a demo doesn't mean it works
3. Find your "Alpha Geek"
4. Don't try to do everything at once
5. Plan to spiral within spirals
6. Be very careful when your developers start thinking they're smarter than the customer

Lessons Learned

7. It’s gotta be easy to use
8. Leverage off what people got and what people know how to use

Questions?

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