Step into C-band

Zodiac Data Systems – Vendor's H/W presentation

ITC 2011 – Bally's – Monday, 05 March 2012

MASTERING THE ELEMENTS

ZODIAC AEROSPACE

Zodiac Data Systems

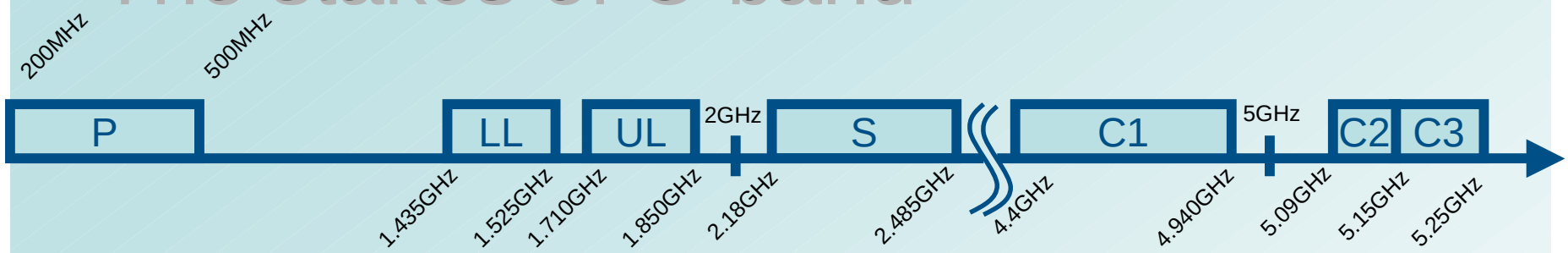
- More than 25 years of experience with telemetry tracking

- Application fields
  - + Remote Sensing
  - + TT&C
  - + Mission Datalink

Flight-test

Missile / Launcher

The stakes of C-band



1. **Multiple bands making a wider aggregate bandwidth**

   US : C1+C2 → Requires « C-band Intermediate Frequency » CIF

   ➔ **Implement CIF-input into receivers**

2. **Transition management**

   Progressive shift from L/S to C band (aircraft first, missile later)

   ➔ **Provide multi-band equipment (antennas, receivers)**

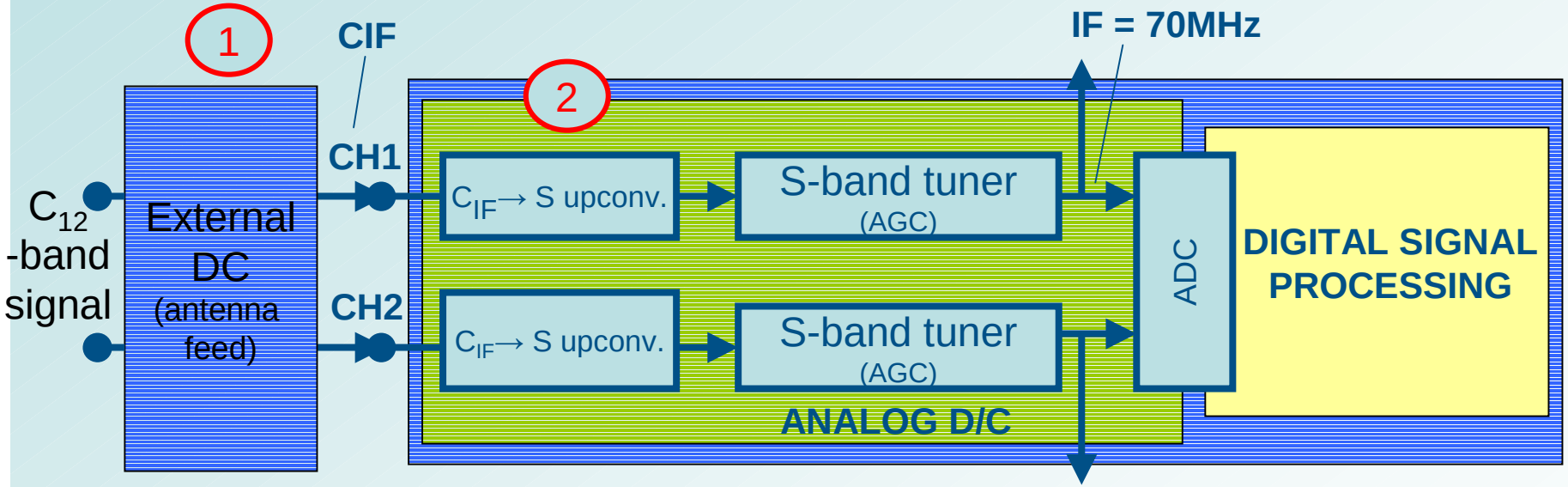
3. **Tracking accuracy**

   Narrower beamwidth makes the tracking harder to achieve

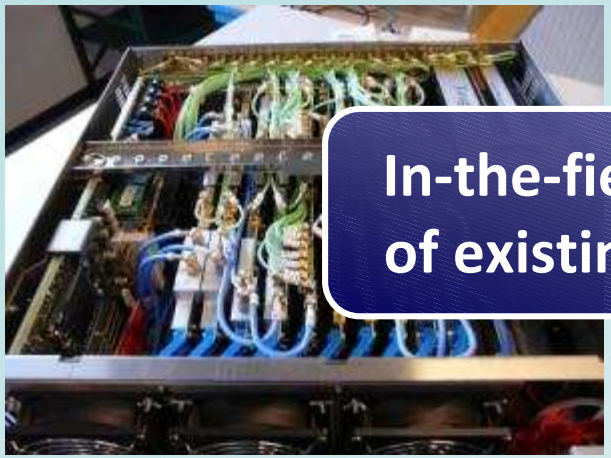
   ➔ **Design high performance Cband antenna (feed) allowing smaller dishes**

Multiband Telemetry receiver

1. **Intermediate conversion stage, preserving Sband-inputs**
2. **Worldwide compatible :**
   1. US : using the CIF conversion board to Sband
   2. RoW : using C2/C3 conversion board to Sband
3. **4-CH receiver : up to Quad Band receiver (C / S / UL / LL / P)**



Multiband receiver towards C-band



In-the-field upgrade of existing receivers

Existing bands	S-band only	S + LL + UL-band	S + LL + UL + P -band
C-band upgraded (Europe/RoW)	S + C_{23}-band	S + LL + UL + C_{23}-band	S + LL + UL+ P + C_{23}-band
C-band upgraded (US)	S + C_{IF}-band	S + LL + UL+ C_{IF}-band	S + LL + UL+ P + C_{IF}-band

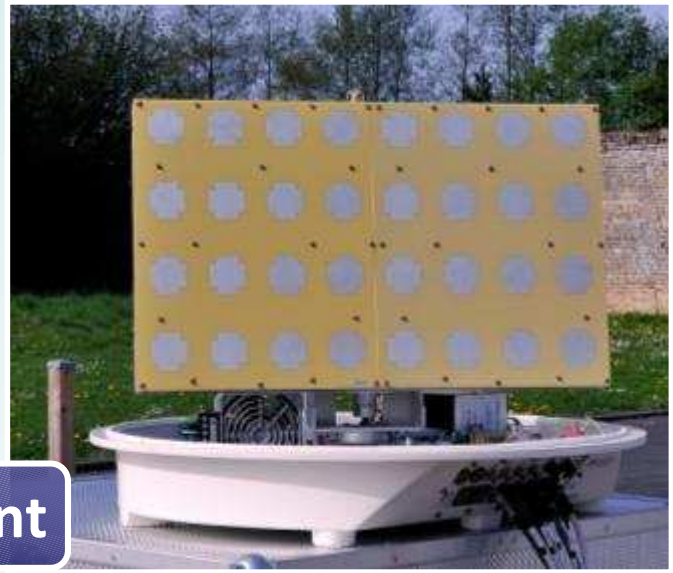
Com'Trak : easily step into C-band

- **Phased array single axis antenna**
  - LNA gain : >43dB ➔ G/T ~ -2dB/K
  - Tracking accuracy 0.5°
  - Directional until 60° El, Omni beyond
  - Unlimited azimth travel
  - Dual polarizaiton

- **Narrower beamwidth than Sband**
  - Split of the array pannel into 2 sub-pannels

  Main: 8x16 for up to 12° El (17-23dBi of gain)

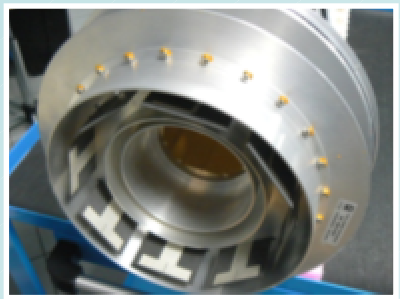
  Auxiliary: 1x8 pannel for up to 60° El (6-12dBi)



Compact **Cost-competitive** **Performant**

Sparte: cutting edge multi-band antenna

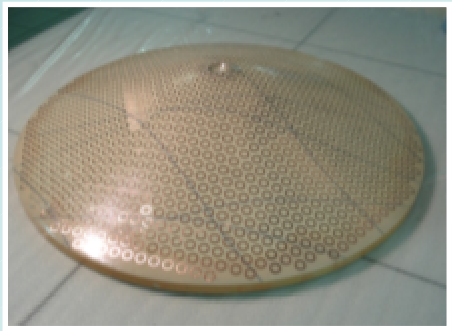
- **L-S, S, C, S+C, L-S+C configurations**
  - 1.8m – 3.0m
  - Conscan (L-S) : very high G/T
  - SCM (S and C) : fast moving targets tracking



- **Maximum performance in C-band**
  - C-band feed at Cassegrain
  - S or L+S feed at prime focus
  - **Dichroic subreflector**

Bi-focus L-S+C / S+C antenna (2.4m)

- **Dichroic subreflector**
  - 100% in-house
  - Low losses
    - 0.2 dB of reflectivity loss (C)
    - 0.2 dB of insertion loss (S)



- **SCM S-band performance (stand alone)**
  - 7dB/K (9dB/K with cable wrap for S+D channels)
  - 9dB/K in slave mode by disabling LNAs (long range)

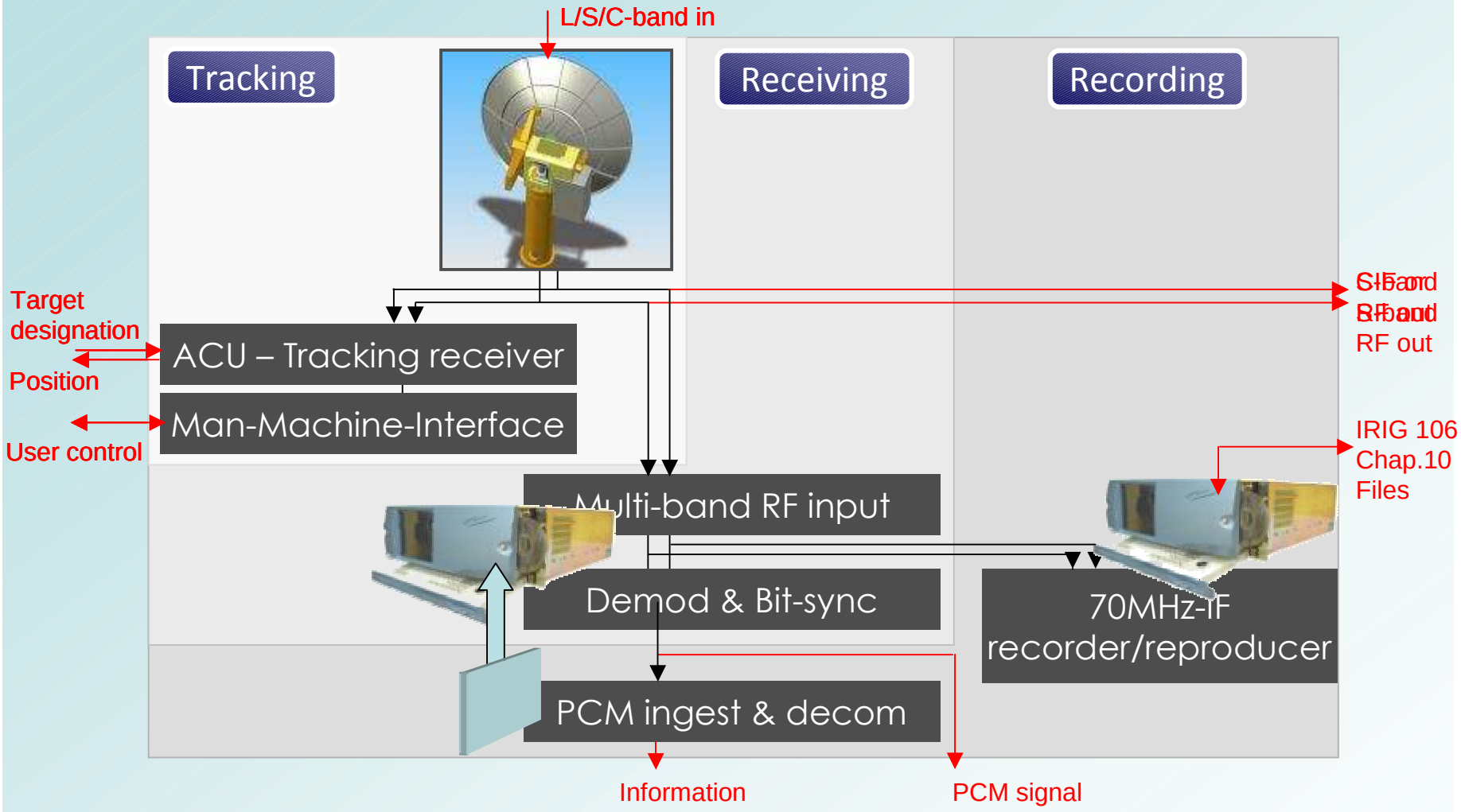
- **C-band performance (bi/tri-band)**
  - 5dB/K (7dB/K sum channels) for S-band
  - 15 dB/K for C-band

High performance

Demanding tracking

20° El

Modern integrated telemetry G/S



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