

Past, Present and future of Performance Based Navigation(PBN)in (South) Africa

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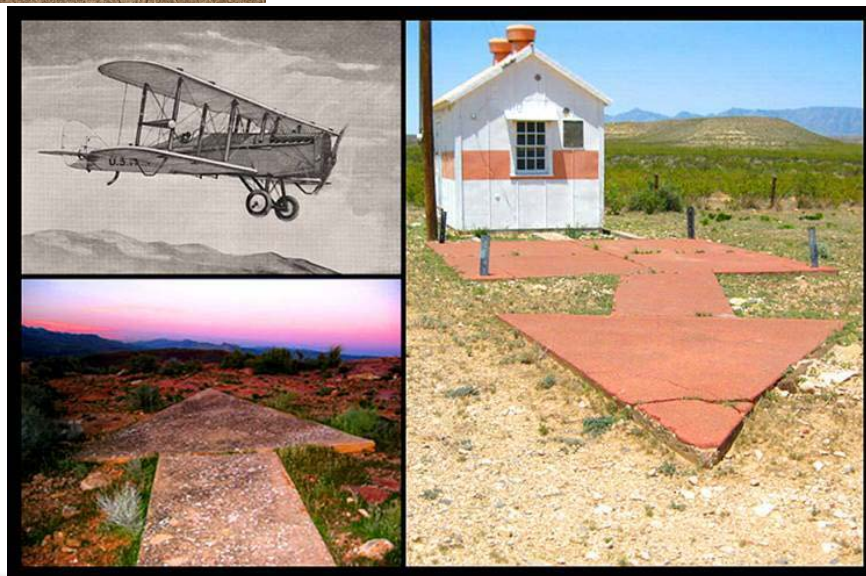
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Before PBN

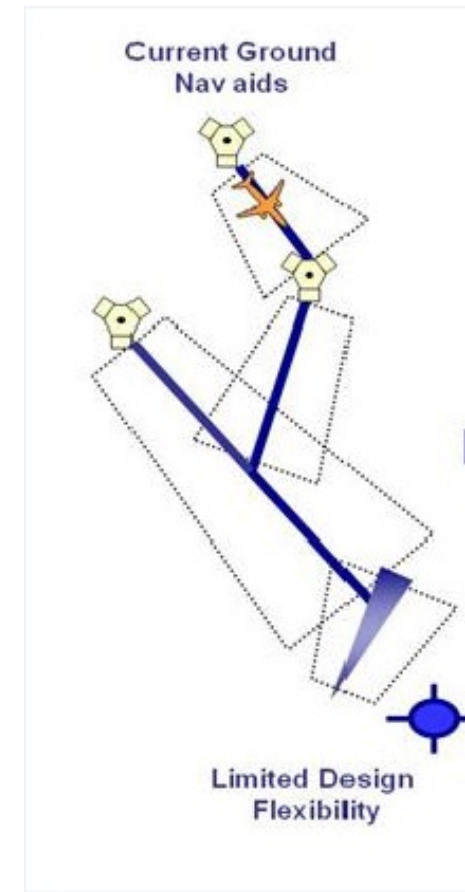


- NDB
- VOR
- “IFR” – I follow roads



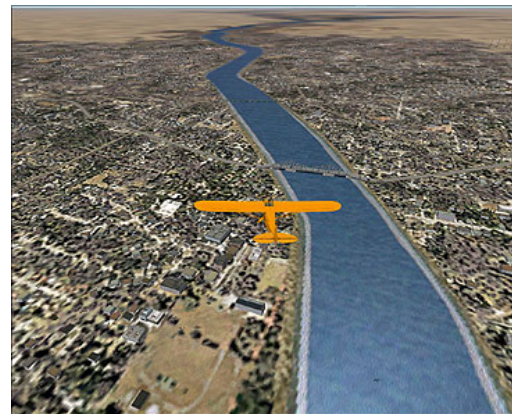
Before PBN

- Aircraft Navigation using Routes & Navigation Aids:
 - Fly Fixed Routes – Nav Aid to Nav Aid
 - Precision Approach – 10 miles straight in



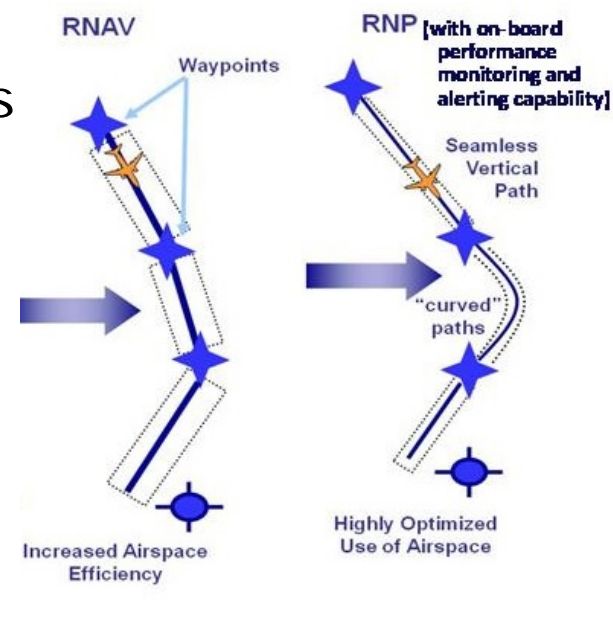
Before PBN

- Constraints:
 - NOT most efficient path
 - Doesn't give continuous "positive fix"
 - can't support "direct to" an arbitrary point
 - can't support defined curve tracks
 - radar vectors – highly tactical – no FMS optimisation
 - no inherent integrity check on Position Determination



Benefits of PBN

- User Preferred Route especially Oceanic
- Curved Arrival / Approach paths
- Noise minimisation
- flexibility in placement
- Direct Track
- Flexibility in Route Design
- Reduced Fuel consumption & emissions
- CCO/CDO

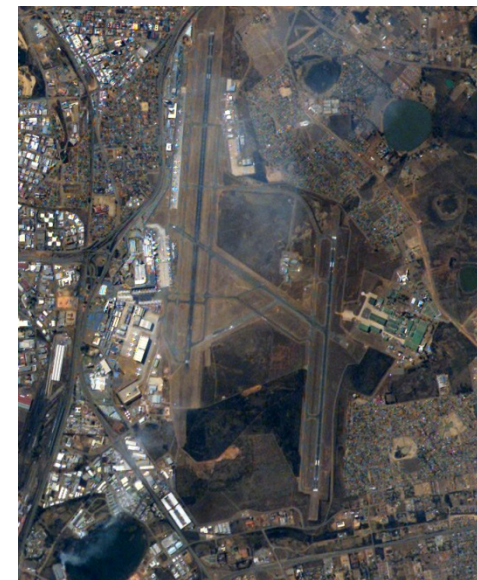


PBN in South Africa

- National PBN Roadmap has been written to be in line with the ICAO AFI Region PBN Roadmap.
- Details the framework within which the ICAO PBN concept will be implemented in South Africa for the foreseeable future.
- The South Africa PBN Roadmap is guided by ICAO Doc. 9613 and relevant SARPS.
- It is the intent of the South African National PBN Implementation Plan to give effect to Assembly Resolution A36 – 23 as amended by the 37 Session of Assembly is included.

PBN Taking-Off

- Implementation of GNSS procedures at ORTIA - 2008
- 8 GNSS arrivals
- 6 GNSS departures
- 2 X RNP APCH's



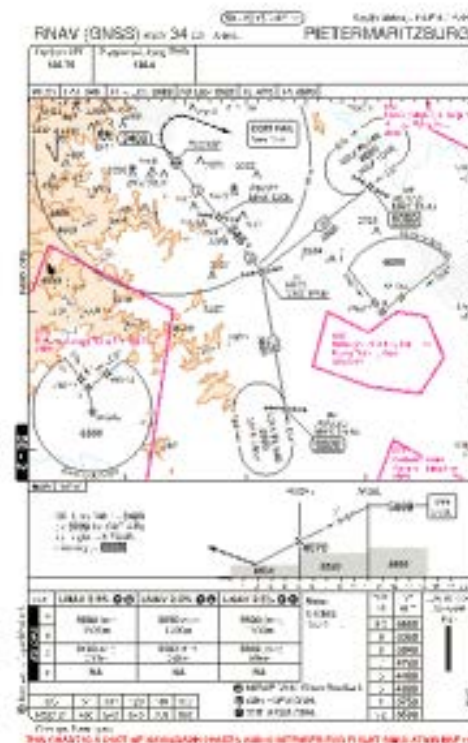
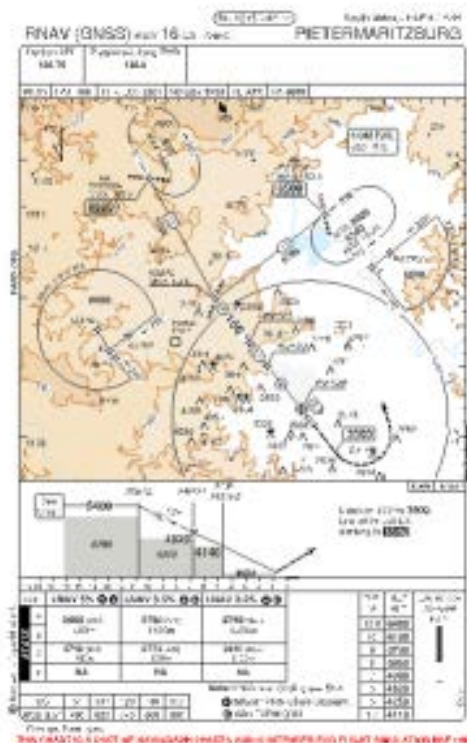
PBN Taking-Off

- Pietermaritzburg (FAPM)



PBN Taking-Off

- Pietermaritzburg (FAPM)
- 2 X NDB Cloudbreak procedures RWY 16/34
- OCA/H – 669/877'
- 2 X GNSS
- OCA/H - 359/677'



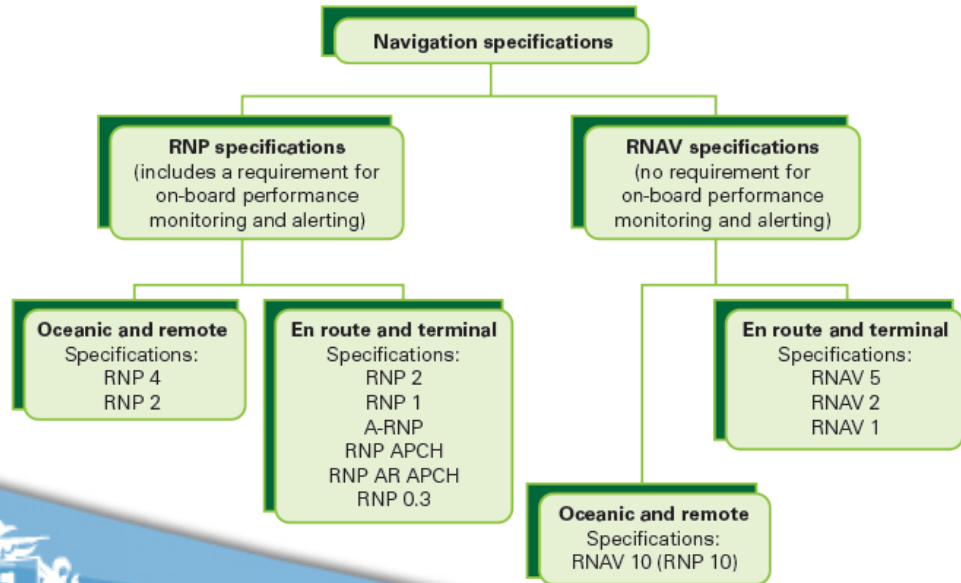
PBN Taking-Off

- King Shaka International (FALE)
- Commissioned April 2010 – SWC
- Decision to Implement full PBN - No Conventional
- Fleet equipage assessment
- ICAO – 70/30 split
- RNAV 2 conversion



Present Initiatives

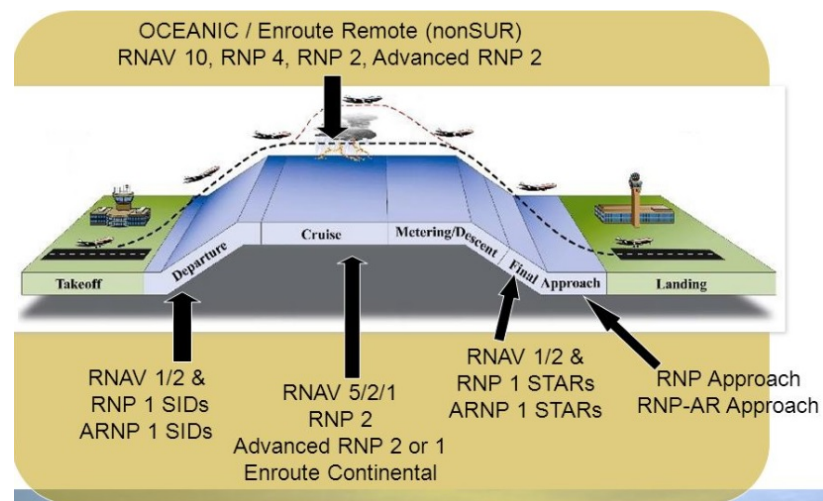
- PBN Implementation Team – SAPIT - 2011
- AIP SUPPLEMENT S011/13 Performance Based Navigation, published on 7 February 2013
- PBN NAVSPEC for South Africa



	GNSS	IRU	DME/DME	DME/DME/IRU	DME/VOR
RNAV 10	✓	✓			
RNAV 5	✓	✓	✓	✓	✓
RNAV 1/2	✓		✓	✓	
RNP 4	✓				
Basic RNP 1	✓				
RNP APCH	✓				
RNP AR APCH	✓				

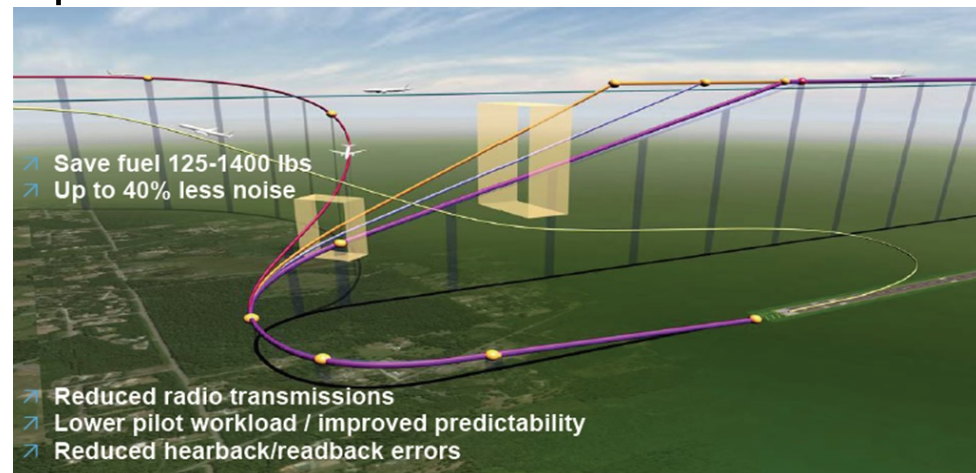
Present Initiatives

- SAPIT have decided on applicable NAVSPECS for each phase of flight.
- En-Route Oceanic – RNAV 10
- En-Route Continental – RNAV 5
- Terminal Airspace – RNAV 1/2
- Approaches – RNP APCH, RNP AR, A-RNP



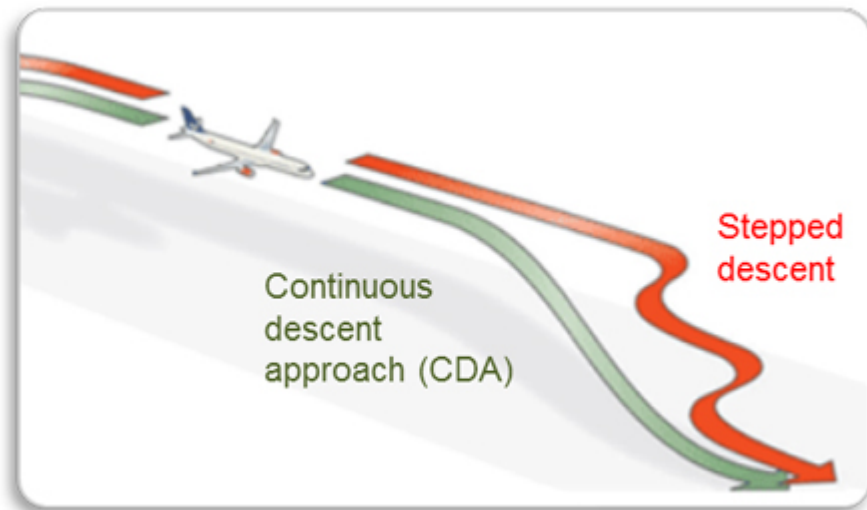
Present Initiatives

- Two-week PBN Seminar/Workshop was held in Boksburg, Johannesburg
- Under the aegis of ICAO and supported by the Global PBN Task Force Go-Team members
- Air Traffic and Navigation Services (ATNS) hosted
- Application of the PBN concept, with CCO/CDO
- 17 step process



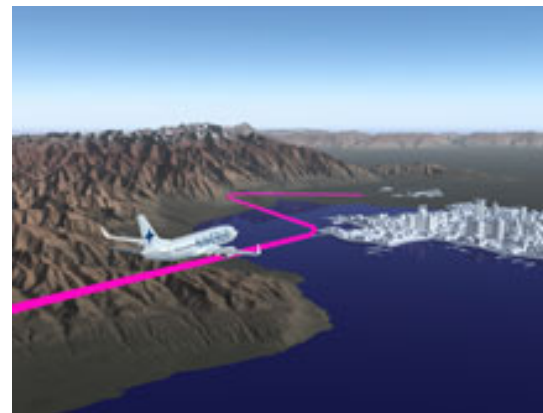
Current Examples

- Transformation of George Airspace – TOGA
 - Procedures finalised
 - CCO/CDO concept adopted for all SID/STAR



Current Examples

- South African Airways – SAA
- SAA facilitated the design of RNP-AR procedures for Cape Town - 2011
- Procedures published in SA-AIP December 2014

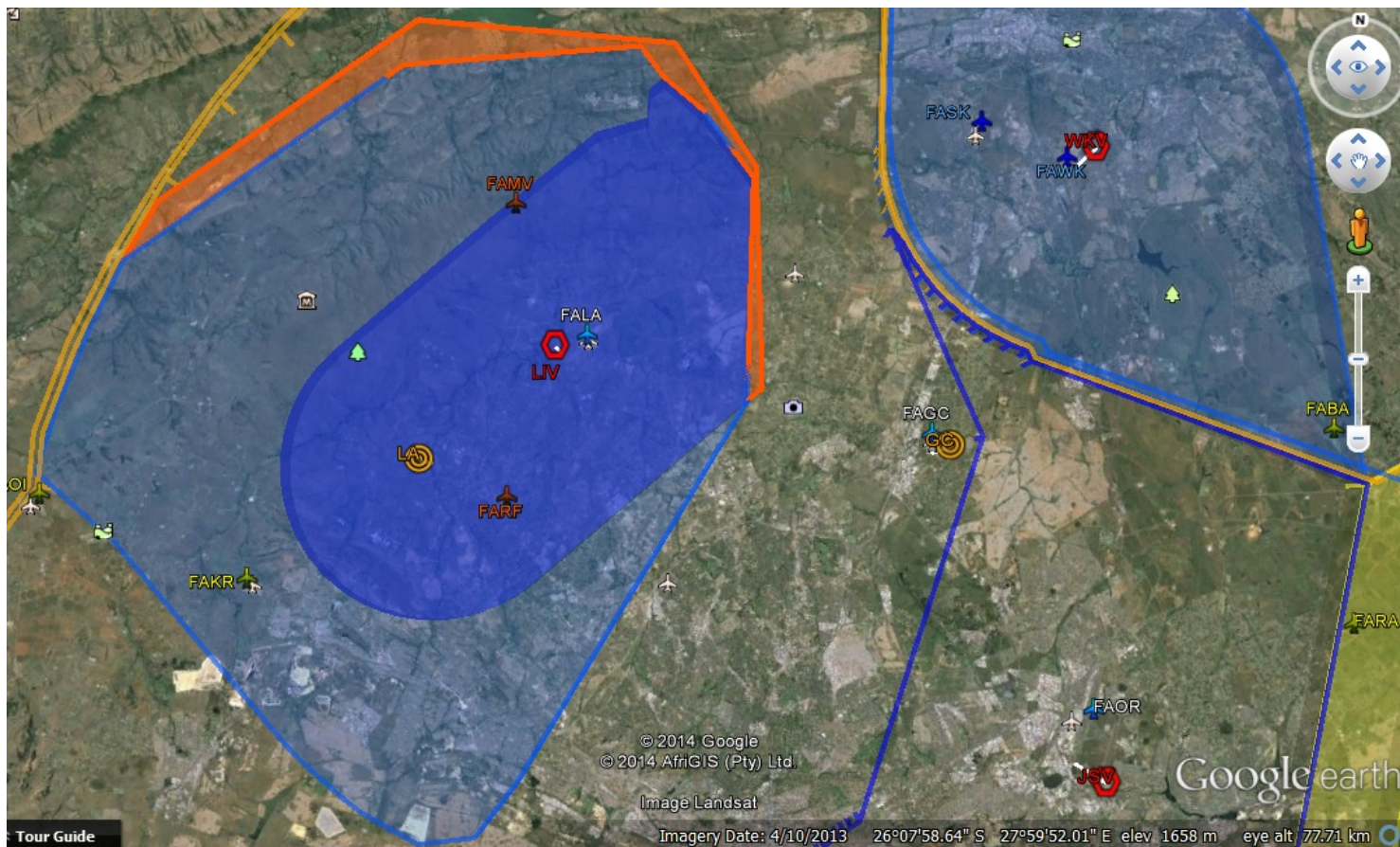


Current Examples

- Advanced RNP trial at Lanseria
- Latest NAVSPEC available from ICAO
- Utilises Radius to Fix turns
- Not as restrictive as RNP-AR
- Improve access into airports with terrain/airspace restrictions

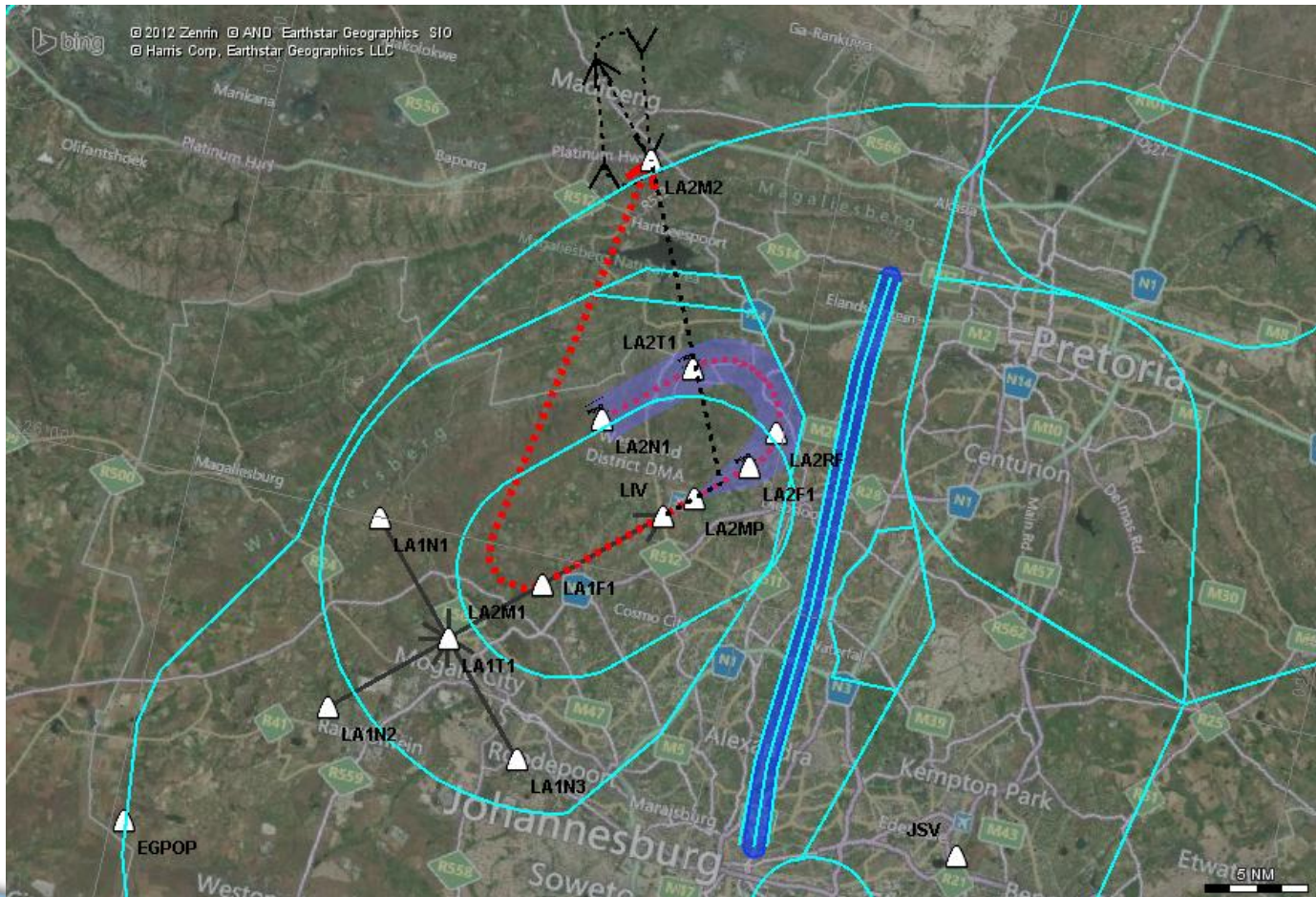
Current Examples

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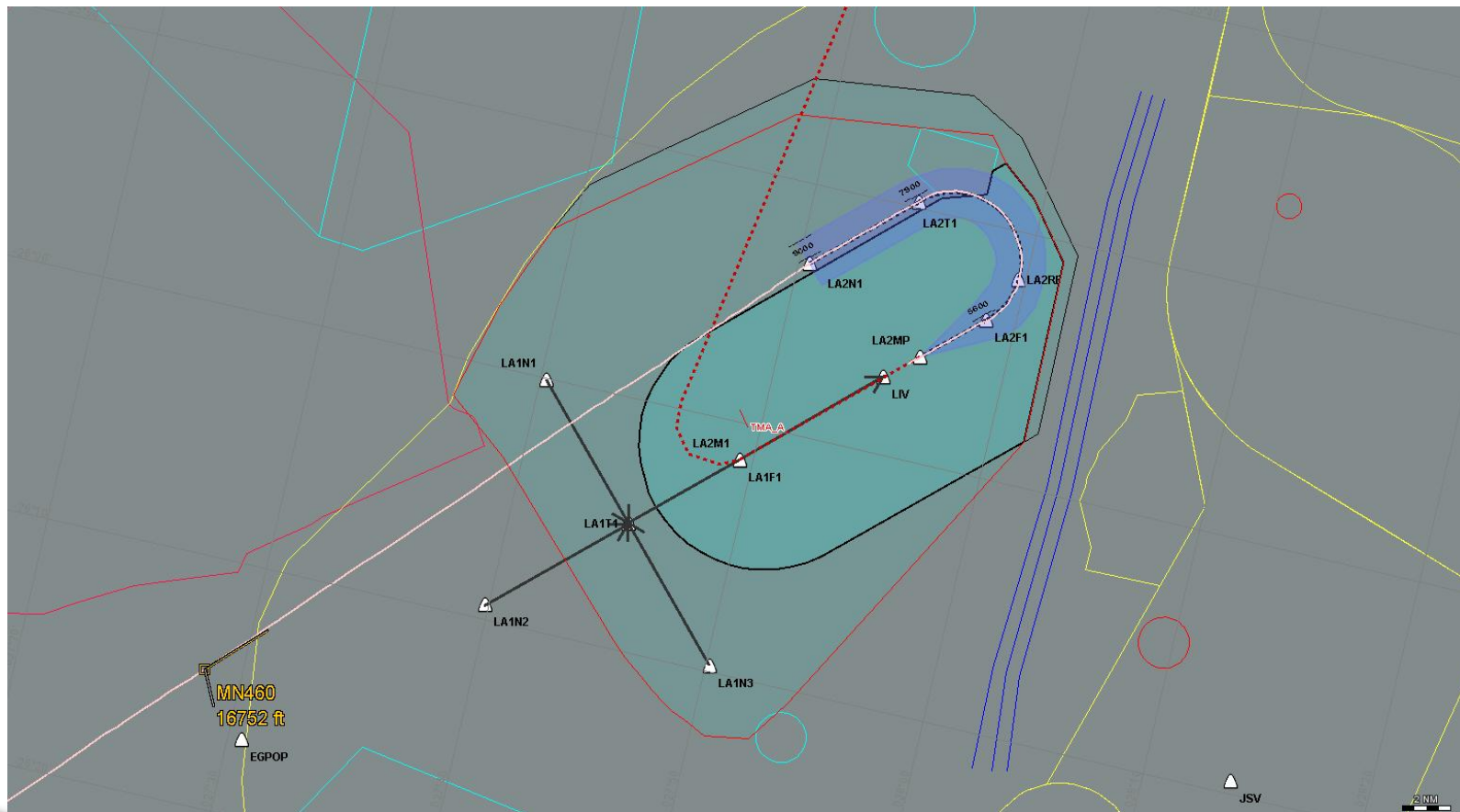
Current Examples

- Advanced RNP trial at Lanseria



Current Examples

- Radar Recordings



Current Examples

- Safety Management System (SMS) used to support the trial
- Trials were conducted in VMC
- The procedure will be submitted to the regulator in March 2015 for validation
- One of the 1st procedures of it's kind in Region



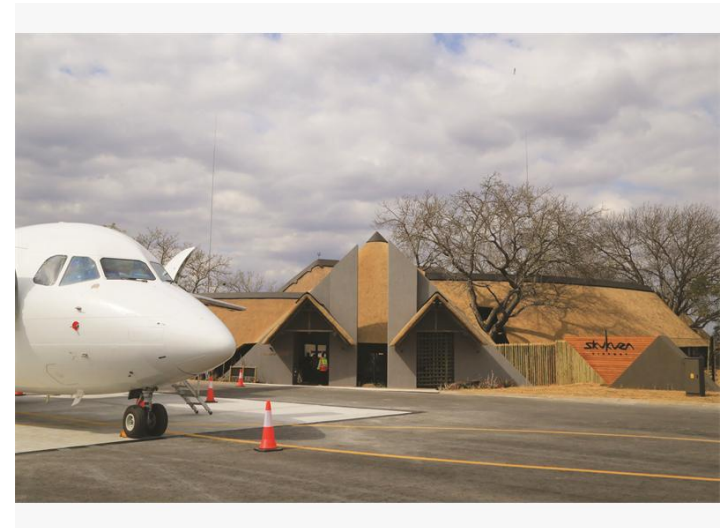
Future plans and initiatives

- Airspace and procedure review for OR Tambo incorporating CCO/CDO
- RNP APCH with Baro-VNAV and CCO/CDO at:
 - Port Elizabeth
 - East London
 - Bloemfontein



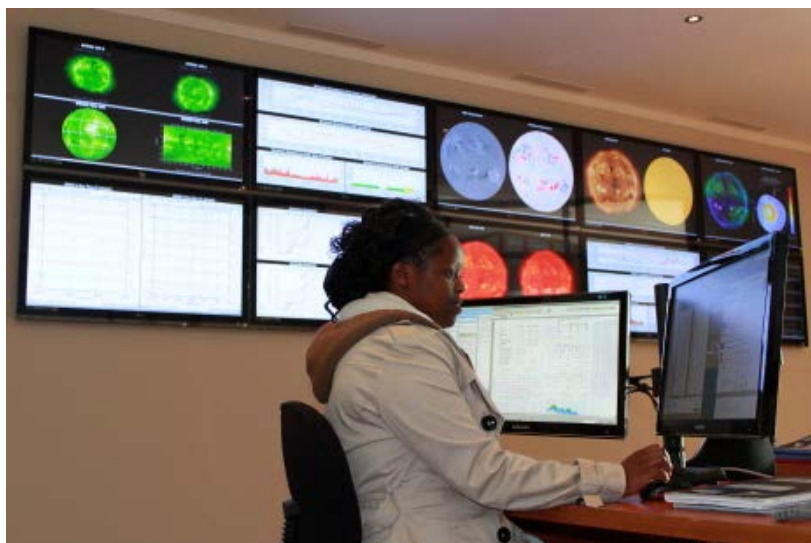
Future plans and initiatives

- Several privately owned airfields are realising the benefits that can be gained from PBN
- Airlines and private operators are consulting with ANSP's and procedure design companies



Future plans and initiatives

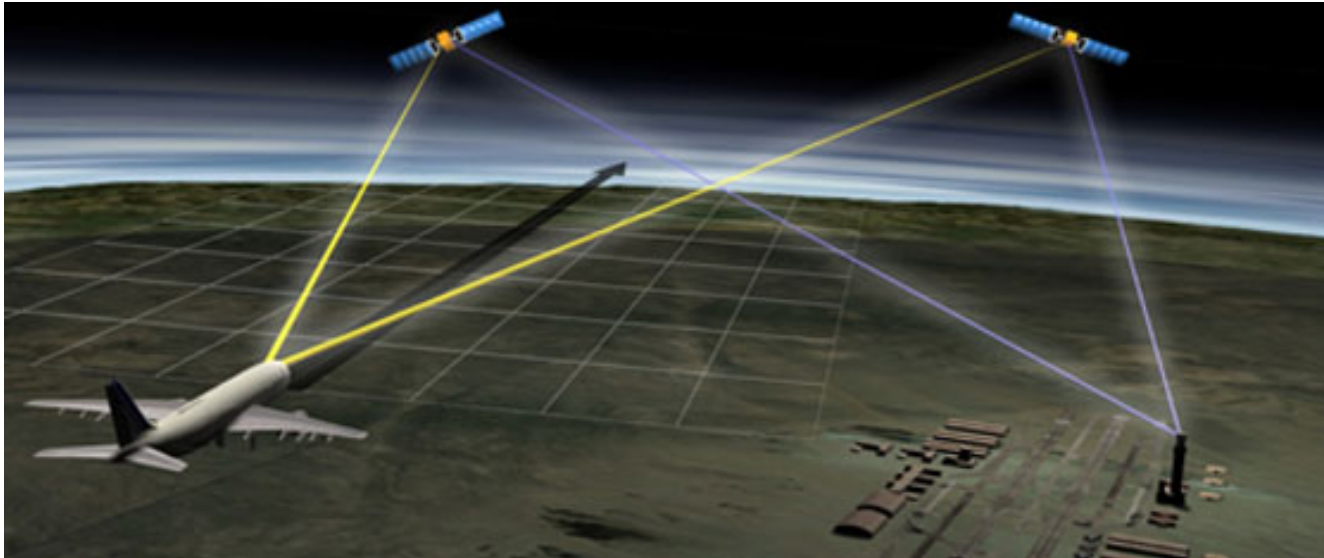
- GNSS monitoring
- ICAO requirement



Conclusion

- The Benefits of PBN will show economic savings for the ATM community:
 - In the form of equipment maintenance for the airport operator
 - Equipment installation and maintenance for the ANSP
 - Less track miles, reduced flying time and less fuel emissions resulting in cost savings for the Aircraft Operators.

Questions



Thank You

