

NAVIGATION SERVICES (RNP Levels.DOC)

Navigation Service	Region	Required Airplane Capability: Sensor & Other	Required Airspace / Groundside Capability	Benefits: Cap, Eff, Safe, Other / environ.	Phase	Follow-On	Sponsor
<u>RNP/RNAV:</u> RNP-12.6 NRP UPT 50/50 separation 30/30 separation 15/15 separation FMS Appr	MNPS NAT 1977 CONUS 1995 US West JUN98 pm Oceanic Oceanic Oceanic Selected airports, US	Dual INS RNAV RNAV (Dual FMS?) Dual FMS, etc.	CRM, HF voice AOC FPS, Host AOC FPS, Host Publ TAPs, Op Approv Publ TAPs, Op Approv Conflict probe	C E E E, S O noise C, E C, E E C	En Route En Route En Route TMA TMA En Route En Route En Route	All altitudes FL290-410 CONUS More US Airports Schipol, etc. CENPAC 03DEC98 CEPAC TBD ALL PAC 24FEB00 P-RNAV, RVSM Russia Far East Polar	NAT IMG FAA FAA FANG ATA FMS TF DLH/DFS FAA Eurocontrol QAN UAL ANZ CAT Eurocontrol
<u>App/Ldg:</u> GPS/NPA GPS/RNAV/RNP (LNAV/VNAV) Integrated RNAV Appr (~ILS) WAAS Ph II LAAS MLS SCAT-1 DO-217 APALS TLS	Australia Juneau US, Africa, S. Amer. CONUS Selected Airports US Heathrow, Schipol Selected Airports US Selected Airports Global Selected Airports US, Subic Bay	GPS (TSO C192), + indep nav sys (VOR) Dual GPS, FMS, EFIS Dual FMS, EGPWS, MMR/GPS, EFIS TBD > TSO C129, D/L MMR/GLS Dual MLS, MMR/MLS MMR/GLS TBD None !!!	Publ TAPs, Op Approv Special TAPs, Op Approv Publ TAPs, Op Approv MOPS, MASPS MOPS, MASPS Publ TAPs, Op Approv Gnd stn TBD, survey rwy lights Special TAP	O retire DMEs S, C C, S O retire navaids C low vis C low vis O O O	Appr Appr Appr En Route Appr Appr Appr Appr Appr	More Alaska sites & Routes Eliminate NPA, Near Cat I Appr Cat I Appr US Cat II, III Appr Limited Private Use Military Use Gnd ->ILS deviations	AirServices Australia ASA Boeing FAA FAA BAB KLM Continental DOD, Lockheed- Martin FAA, ANPC

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<u>RVSM:</u>	NAT 27MAR98	Altimetry system, autopilot (height-keep)	HMU, CMA	C, E	En Route	ECAC 2000? ALL PAC 24FEB00 CONUS ???	NAT IMG
<u>Augmented GNSS / SBAS</u>							
WAAS Ph I	CONUS Jul 99 IOC	TBD > TSO C129, D/L	MOPS, MASPS	O retire navaids	En Route	Ph II: Cat I Appr	FAA
WAAS Ph II	CONUS 2000	TBD > TSO C129, D/L	MOPS, MASPS	O retire navaids	En Route	Ph II: Cat I Appr	FAA
WAAS Ph III	CONUS Nov 2001 FOC	TBD > TSO C129, D/L		O retire navaids	En Route	Ph II: Cat I Appr	FAA
EGNOS	ECAC, AOC 2002	TBD		O	En Route	NPA, Cat I Primary	Eurocontrol
EGNOS	ECAC, FOC 2005	TBD		O	En Route	NPA, Cat I Sole	Eurocontrol
MSAS Ph I	Japan, Pacific 2001	TBD	TBD		En Route		JCAB
MSAS Ph II	Japan, Pacific 2004	TBD	TBD		En Route		JCAB
CWAAS GNSS-2	Canada 2001						
<u>TNAV / RTA:</u>							
1-10 minute <1 minute	FANS-1 routes CNS/ATM-1 routes	FANS-1 FMS upgrade, ATN	Host DSS CTAS, DSS	C, E C, E	En Route TMA		
<u>Hazard Separation</u>							
Wake Vortex 3D Perspective Path / Tunnel Enhanced / Synthetic Vision Heads Up display		PFD/ND changes PFD/ND changes Lidar, IR, etc.					
<u>Surface Operations</u>							
Taxy Guidance, Airport Layout To/GA Updating	N/A	Sensor(s), Nav DB, Hi- Res Nav Display PIP, 777, Pegasus					