GNSS Application in Aviation: Nepal

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Narayan Dhital
AirMeetsSpace (AmS) Engineer
Narayan.Dhital@dlr-gfr.de

Reliable, Secure and Safe Aerospace Services
Agenda

- About DLR GfR
- Nepalese Aviation: Scenario, Demands, and GNSS Potentials
- GNSS Augmentation Systems: GBAS
- GBAS Readiness Assessment Service
• DLR GfR (est. 2008) is a subsidiary of the German Aerospace Center (DLR) with headquarters at the DLR site Oberpfaffenhofen/Munich

• Approx. 120 engineers and specialists take care of the operational safety of the Galileo satellites and the control center

• Commercial services and products in the air/space domain

• DLR GfR holds an Air Navigation Service Provider (ANSP) certificate, being the first and only space control center worldwide to do so
Since 2013 co-operation with Austrian Air Traffic Control

**Main Objectives:**
- Joint products and services for ANSP domain
- Precise Landing Systems (e.g. GBAS) and Training as core topics
- Ionospheric Measurement Station at Vienna International Airport
- Joint proposal for Airspace Modernization and PBN development in **Nepal** delivered in May, 2015
Nepalese Aviation Scenario, Demands and GNSS Potentials

- Difficult terrain, drastic weather conditions
- Conventional non-precision approach and landings
- Tribhuvan International airport, the only international airport
GNSS Augmentation: GBAS

- Stand alone GNSS based operations are affected by various error sources
- Safety of life (SoL) application needs stringent requirements (Integrity, accuracy, availability and continuity)
- Met by augmenting GNSS signals

- GNSS satellites (e.g. GPS, Galileo, Glonass,…) send navigation signals
- GBAS ground station receives them, calculates corrections and integrity information and sends these (together with flight path information) to the approaching aircraft
- Receiver on board the aircraft uses GBAS information together with own received GNSS signals for precise landing navigation
GBAS Benefit Areas

- Higher safety, especially in difficult terrain conditions
- Increase in Airspace capacity
- Less physical space for installation, less stringent siting
- Less affected from terrain disturbances (omni directional broadcast)
- Operational and maintenance cost reduction
- All weather precision approach and landing

How does landing look like in zero visibility?
Our GBAS Readiness Assessment Service

• Systems engineering, procurement and installation
• Operations and Maintenance
• Documentation
• Certification Readiness Preparation
GBAS Testbed at Oberpfaffenhofen Special Airport
Summary and Outlook

• GNSS is becoming the key capacity for Air navigation
• Nepal's topography present a unique environment for Air operation
• GBAS will be the future precise navigation aid worldwide
• AmS program at DLR GfR offers manufacture independent GBAS services
• DLR GfR is on the way to become the main European GBAS Operator
Ladies and Gentlemen, we are now preparing to land at Tribhuvan International Airport in zero visibility.

Thank You For Your Attention.