AFRAA- Presentation to Regional WS GNSS SBAS Airline's Perspectives

Better Skies for Africa

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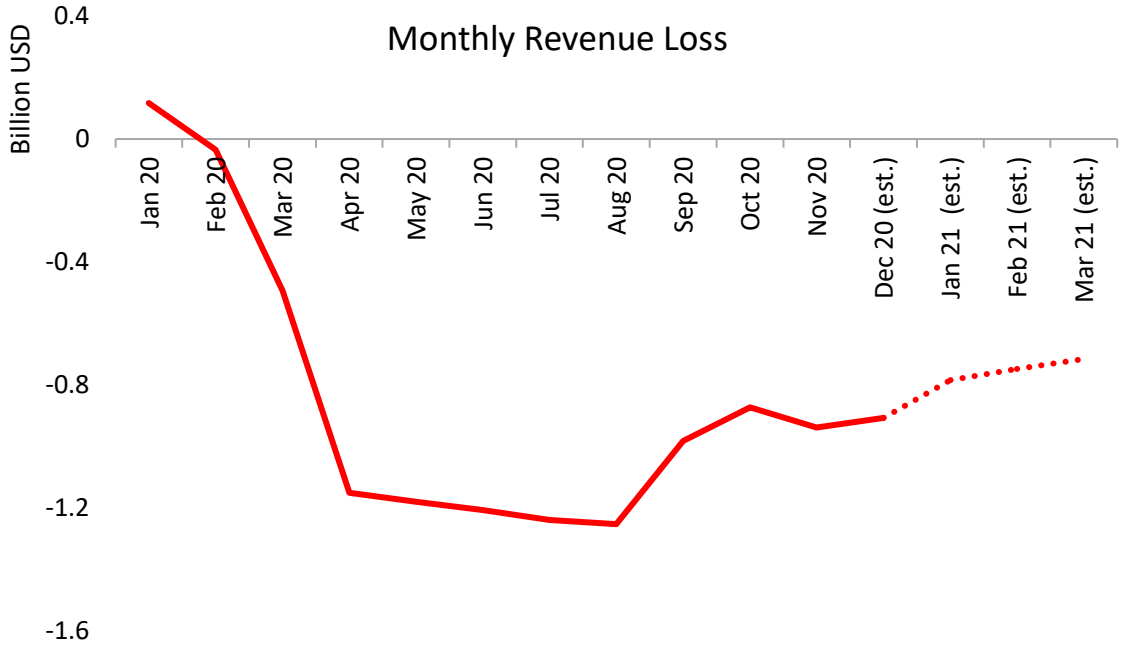
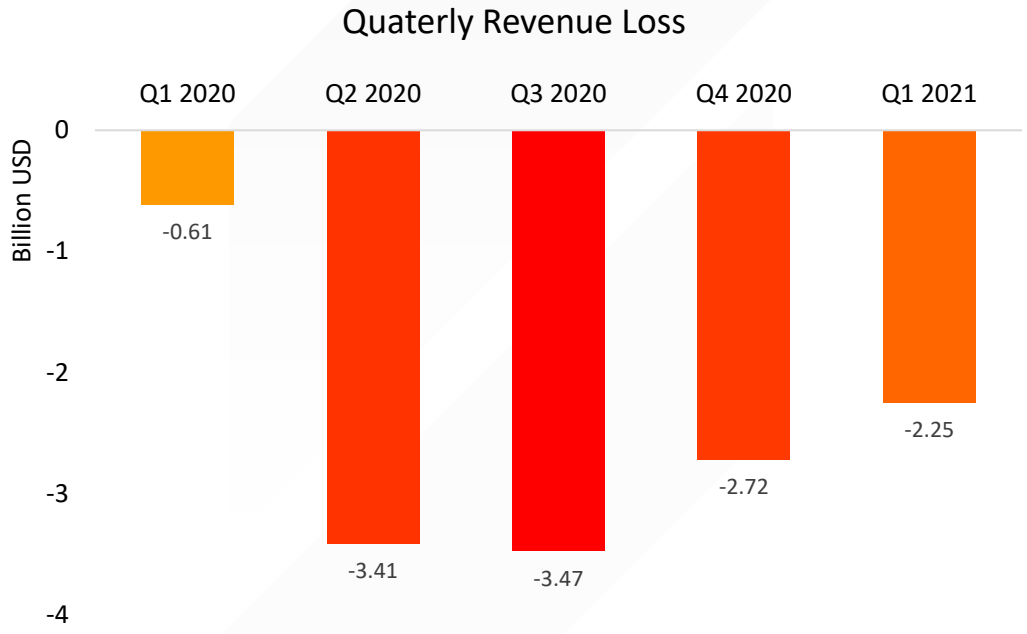
The State of the Industry in Africa

Passenger Revenue loss (compared to 2019)





Source : AFRAA/OAG

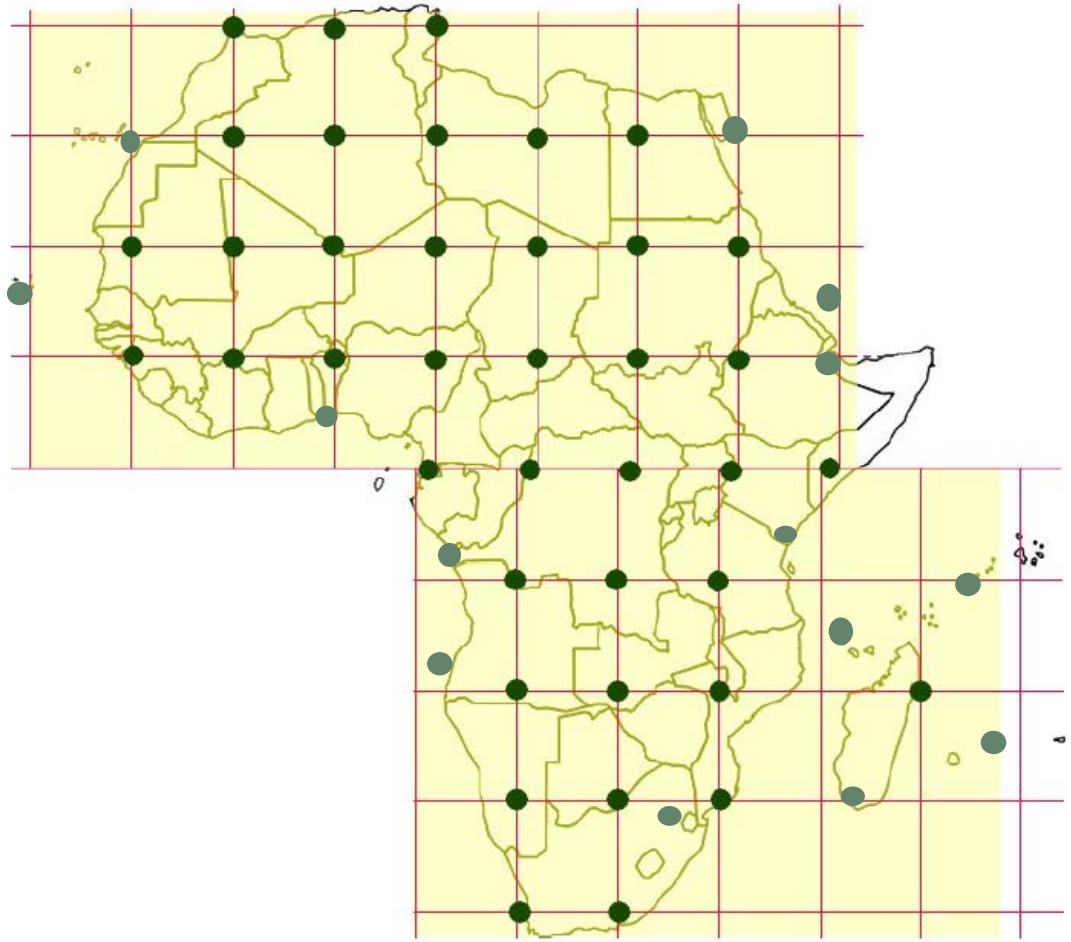
Assumtion :
50% traffic recovery on Q1 2021 compared to 2019

- Estimated Revenue loss for 2020 : USD 10.21 billion
- Estimated Revenue loss for **Q1 2021** : **USD 2.25 billion** (17 Feb assessment)

Infrastructure Challenges

- **The triangulation of a set satellites of GNSS constellation determines the coordinates of a station on Earth:**
  - **The set of satellites in sight at a given location varies within 24 hours; however the set is unique at any time. Hence, GNSS constellation determines fixed stations coordinates accurately in a location.**
  - **Locations 500 NMs apart have got different set four satellites; therefore, it is necessary to survey accurate coordinates of ground reference position every 500 NMs; SBAS must continuously detect errors in their coordinates of ground reference stations and transmit the same to aircraft operating in their vicinities.**
  - **Superimposing 500 NM grid on Africa, lead to a need of about 70 ground reference stations to cover the Region.**

Infrastructure Challenges



Infrastructure Challenges

- **The infrastructure will require:**
  - **50 to 60 ground reference stations to cover the Region.**
  - **8 master control stations; 12 uplink stations; 3 Geostationary satellites.**
  - **Redundant circuits linking the various stations as an aircraft in approach must receive the required SBAS corrections continuously**
  - **Africa made progress in operating 3 main VSAT networks to meet the regional ground – ground communication requirements; they are AFISNET, SADC VSAT and NAFISAT. We still experience flight plan losses from time to time.**
  - **To support navigation, the communication circuits must be more robust and reliable.**
- **Do remember that Europe and USA combined are about 2/3 of Africa yet:**
  - **WAAS and EGNOS combined use 78 ground reference stations; 8 master control stations; 12 uplink stations and 6 geostationary satellites.**

SBAS-Capable vs. Non-SBAS Capable A/C

BOEING does not offer LPV capability for any aircraft except B777-9

SBAS CAPABILITY	Type of Aircraft	Current Status	Certified RNP	SBAS Equipage Requirement
SBAS Capable	E190	Equipped with SBAS capable MMR	0,3	New a/c would be delivered equipped
	B737 Max	Equipped with SBAS capable MMR	0.1	New a/c would be delivered equipped
	A350	Equipped with SBAS capable MMR	0.1	New a/c would be delivered equipped
Non-SBAS Capable	A320	Not equipped with SBAS capable MMR	0.3 / 01	Relevant modification
	B737-700/800	Not equipped with SBAS capable MMR	0.1	Replace MMR; replace GNSS antenna; software installation and wiring
	B787	Not equipped with SBAS capable MMR	0.1	Currently. no OEM plan for SBAS – ABAS with Integrated Surveillance does not support SBAS or LPV
	B777 (*)	Not equipped with SBAS capable MMR	0.3	Retrofit kit including MMR
	B767	Not equipped with SBAS capable MMR	0.3	Retrofit kit including MMR

No Safety Gain or Efficiency Gain for Non-SBAS Capable Commercial Jets

EN ROUTE		TMA	
RNP 10 / RNP 4		**RNP 0.3**	
SBAS Non-Capable	SBAS Capable	SBAS Non-Capable	SBAS Capable
Based on Aircraft Based Augmentation System (ABAS) commercial jet performances, there is no safety or efficiency advantage for SBAS-Capable aircraft vs. Non SBAS Capable airplanes		ABAS aircraft have got 0.3 and 0.1 PBN	SBAS Capable aircraft have got 0.3 and 0.1 PBN
		• **No SBAS advantage for commercial aircraft;** • Where ILS Cat II or Cat III minima are required GBAS should be considered; as one GBAS system will provide GLS II or GLS III. For instance, in LOS, only one GBAS is required for GLS III at all 4 runways.	

Retrofit Cost for a Member Airline Fleet

Item	Unit Price	Qty	Line Total
Total Cost For B787 Fleet			No certification plan for SBAS ABAS certification plan is still in progress
Non-Recurring Engineering , wire Kit and SW kit for B737NG	$ 87 500,00	37	$ 3 237 500,00
BFE (MMRs , GPS Antennas) for B737NG	$ 333 000,00	37	$ 12 321 000,00
Installation Cost	$ 8 500,00	37	$ 309 000,00
Total Cost For B737NG Fleet			$ 15 867 500,00
Non-Recurring Engineering , wire Kit and SW kit for B767-300 Cargo	$ 87 500,00	1	$ 87 500,00
BFE (MMRs , GPS Antennas) for B767-300 Cargo	$ 500 000,00	1	$ 500 000,00
Installation Cost	$ 21 800,00	1	$ 21 800,00
Total Cost For B767 Cargo aircraft			$ 609 300,00
Total Cost			**$ 16 476 800,00**

Infrastructure Challenges – CDM Process

- It is crucial that the required infrastructure for entire Region be set
- Its cost be assessed
- Its funding be solved
- As for RVSM, the stakeholders to agree on an implementation plan including the proportion of equipped fleet operating in the airspace
- SBAS capability retrofit cost is prohibitive when retrofit certified kits are offered
- In certain cases, OEM do not offer LPV capabilities

COVID-19 – Busines as Usual?

- **Increasing number of airline bankruptcy worldwide and in Africa while many States' borders remain closed**
- **Increasing number of grounded aircraft (high percentage of non-SBAS capable)**
- **Entire Aviation Sector affected; even France decided not built the 4th terminal at CDG, at least for now.**
- **Why should Africa rush to undertake SBAS implementation in the near future?**
- **AFRAA stands ready to work with the stakeholders on the continental CBA of a sound SBAS infrastructure in the space, on ground and onboard the aircraft .**
- **SAATM, AfCFTA, great programs to revamp Aviation in Africa.**

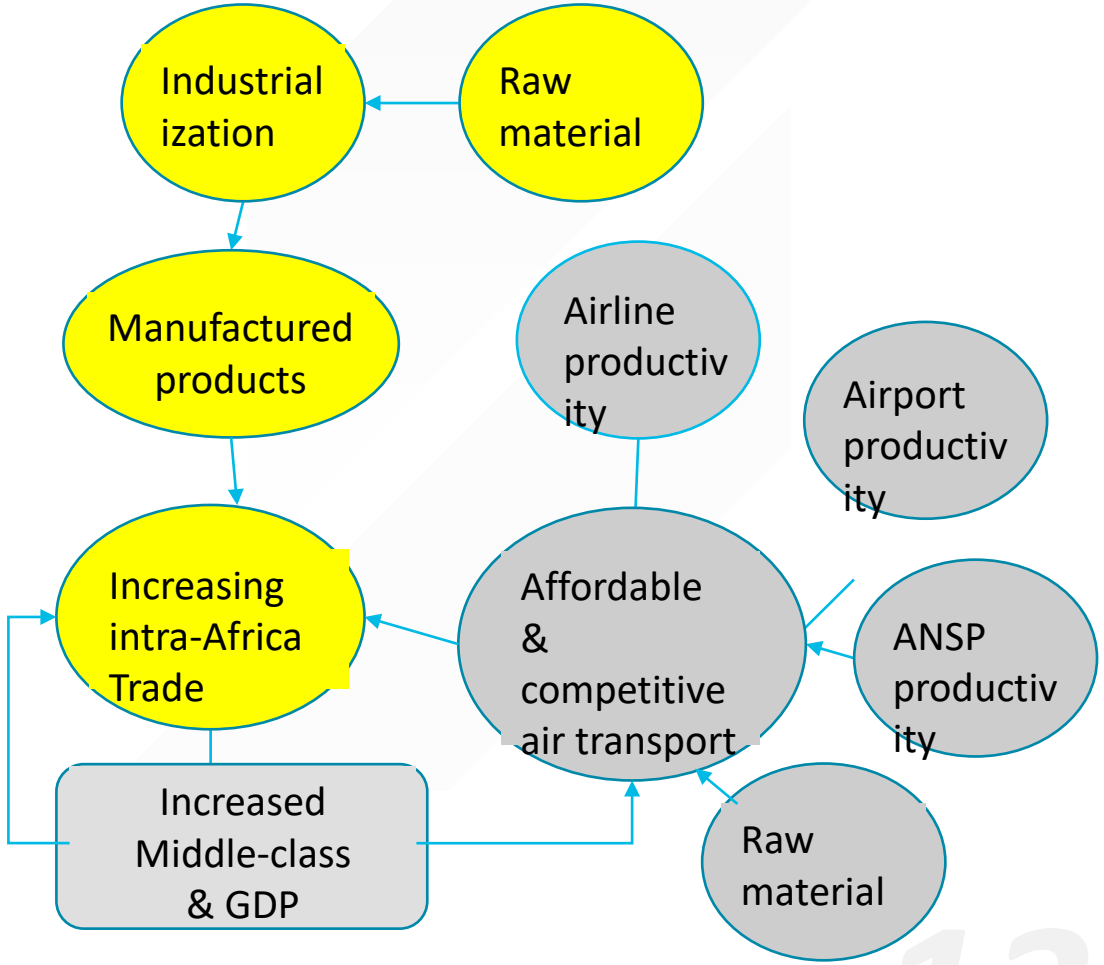
Revamping Aviation Sector in Africa

- **Africa per capita national income is much lower than that of Europeans**
- **Yet African purchase air travel services at much higher prices than Europeans**
- **After safety, our priority is how collectively we make air transport affordable**

Opportunity for Strategic Aviation Innovation

Hold the Lab approach to Innovate and Relaunch Aviation in Africa

- **The COVID-19 devastating effects;**
- **Applying the lab approach to innovate through Africa Aviation Revamp-LAB.**
- **Relevant Aviators including Airlines, ANSPs, Airports, airport service providers and CAAs must innovate to make the African air transport safer, competitive to be an efficient logistic system to support the industrialization, trade, torism, and other key economic sectors anchored on AfCFTA and SAATM.**



Regional Development Financial Institutions

Conclusions

- **COVID-19 is**
  - **Increasing number of airline bankruptcy worldwide and in Africa;**
  - **Increasing number of grounded aircraft (high percentage of non-SBAS capable)**
- **Together, let us assess the continental CBA sound SBAS infrastructure thoroughly.**
- **Africa needs to refocus on a coordinated and harmonized priority to revamp Air Transport in the Region**
- **With relevant stakeholders let's hold a LAB where:**
  - **Trade, Industrialization ought to demand affordable fares and cargo tariffs from the Aviation Sector**
  - **Increasing trade of manufactured products creates needs for news air connections**
  - **Financial institutions to fund trade, industrialization and aviation in the framework of AfCTA and SAATM.**
- **The development of Intra-Africa trade industrialization and air transport will increase the size of middle-class citizens their per-capita income and raise air transport demand to revamp aviation sector in the Africa.**

CONTACTS

African Airlines Association
P.O.Box 20166 00200 GPO
Nairobi, Kenya
GSM: +254 20 2320144 | +254 20 23 20148
Cell: + 254 (0)722 20978| +254 (0)735 337669

www.afraa.org

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