

TERMS OF REFERENCE
Special Committee (SC) 223
Airport Surface Wireless Communications

REQUESTOR:

Organization	Person
FAA ATO-P	ATO-P/Jim Williams

SC LEADERSHIP:

Position	Name	Affiliation	Telephone	email	Change
Co-Chair	Ward Hall	ITT/Aerospace Communications Division	260-451-6143	Ward.Hall@itt.com	<i>(link to changes in names)</i>
Co-Chair	Aloke Roy	Honeywell International	410-964-7336	Aloke.Roy@Honeywell.com	
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Secretary	Steve Henriksen	ITT	703-668-6195	Stephen.Henriksen@itt.com	

BACKGROUND:

To date, no wide bandwidth wireless ground/air or ground/ground data communications systems have been identified for the U.S. National Airspace System (NAS) to accommodate the voluminous data that has been planned by NextGen and the FAA for information exchanges among aircraft, other mobile users on the Airport Management Area (AMA) and stakeholders operating in the airport environment. Development of an aviation specific standard based on the existing Institute of Electrical and Electronics Engineers (IEEE) 802.16e standard may provide a low-cost alternative technology to enable Airport Surface Wireless Communications (ASWC) for both safety and regularity of flight communications.

The proposed aeronautical communications network was enabled through actions taken at the 2007 ITU World Radiocommunication Conference (WRC-2007) to allow new aeronautical mobile route services (AM(R)S) in the MLS Extension Band (5091-5150 MHz). [NOTE: Advancement towards the development of an international standard for aviation use of the authorized spectrum (i.e., currently 5091-5150 MHz, and potentially 5000-5030 MHz) must be presented at WRC-2012 or the U.S. aviation community may risk the loss of this spectrum.

A variety of safety-critical services and applications may be supported by the proposed IEEE 802.16e link. These include, for example, several of the network-centric Mission Services, Support Services, and

SWIM-Oriented Architecture (SOA) Core Services envisioned in the NAS Enterprise Architecture SV-4 Framework. Services supported could include uploading surface movement taxi guidance and “4D” trajectory guidance could be loaded into the aircraft’s Flight Management System (FMS) using a wide area local network such as IEEE 802.16e to enable 4D Trajectory-based Operations (TBOs) through all phases of flight including the airport surface. Additionally, various Aeronautical Information (AIM) and metrological (MET) data products can be provisioned via a network. Depending on the network architecture developed, aircraft-to-aircraft, aircraft-to-vehicle, and vehicle-to-vehicle data exchanges may also be supported by this new communications network for a variety of situational awareness applications. Finally, the same ASWC capabilities may be utilized for communications with and among fixed assets on the airport surface, such as surveillance, lighting, and telecommunications infrastructure.

The European Commission and EUROCONTROL are also sponsoring work projects under SESAR (*Single European Sky ATM Research*) *Joint Undertaking (SJU)* to progress the design and assessment of this emerging wireless communications technology. EUROCAE has recently assigned Working Group 82 to develop parallel standards in Europe.

DELIVERABLES:

Product	Description	Due Date	Change
Aviation System Profiles for Airport Mobile Access Communications Network	Aviation Specific System and Certification Profiles based on IEEE 802.16e	Sept 2010	<i>(link to all changes to dates, updates to docs)</i>
MOPS for Airport Surface Wireless Mobile Access Communications Network	Airport Mobile Access Communications Network characteristics and MOPS for the system equipment, to be used as a basis for equipment TSOs	Dec 2011	

SCOPE:

The proposed standards would be used to support future mobile and supporting fixed data communication applications and services for both ground/air and ground/ground communications services on the airport surface. Examples include information exchanges to support Collaborative Decision Making (CDM); Surveillance Broadcast System (SBS) applications, and System Wide Information Management (SWIM) data exchanges, and its extension to aircraft (“SWIM-Air”). (The latter includes aeronautical and metrological data link services.) Development of technical standards for products that support both the airborne and ground segments would make extensive use of the IEEE 802.16e-2005 standard (and its updates) to establish a mobile local area network (LAN) on the airport surface that may also include fixed elements.

In particular, the IEEE 802.16e, C-band LAN in this AM(R)S allocation would allow for the exchange of all types of safety and regularity of flight data required to support NextGen applications. Two of the more widely recognized applications that this system could support are the loading of a full 4D Flight Plan including surface movement guidance (i.e., the “D-Taxi” application) directly into the aircraft’s

flight management system. Subsequent changes to this air traffic set of instructions would then be accomplished either at the gate or whenever and wherever a change was needed while operating on the airport surface. Exchange of Aeronautical Information Services (AIS) and meteorological data could also be accomplished using this link, albeit, its use would be restricted at this time to use on the airport surface only. (See RTCA DO-308.)

A number of non-aircraft mobile systems for use on the AMA (e.g., service and emergency vehicles use, snow plow operations) could also use the C-band system to exchange information between and among aircraft, vehicles, and ground control operators.

ENVISIONED USE OF DELIVERABLE(S)

1. The IEEE 802.16e based network MOPS developed in SC-223 will be used as a reference in the development of other application-specific MOPS by other RTCA special.
2. The IEEE 802.16e based network MOPS developed in SC-223 also will be used by regulators to base a Technical Standard Order (TSO) for the enabling communications equipment. (Application-specific MASPS and MOPS enabled by this network would be developed in other appropriate technical committees.)
3. The Aviation Specific System and Certification Profiles based on IEEE 802.16e developed in SC-223 will be used to provide guidance useful to designers, manufacturers, installers and users of the ground based Airport Mobile Access Communications network equipment.

SPECIFIC GUIDANCE:

SC-223 will develop an Aviation Specific System Profile that could be used to guide the design and manufacture of equipment and systems used for the implementation of a nationwide system of wireless broadband airport surface networks derived from the IEEE 802.16e standard. The proposed airport data communications network would operate in designated parts of the 5091-5150 MHz band (and potentially, the 5000-5030 MHz spectrum allocation pending WRC-2012 decisions). SC-223 will then develop a network-specific MOPS.

The proposed ASWC “Profiles” would define the subset of the IEEE 802.16e and related standards needed to provide the desired safety and regularity of flight functions, including operational goals for the airport surface wireless system. These profiles would be consistent with the broader IEEE 802.16e standard. In particular the profiles would:

1. Describe typical airport surface mobile and fixed operating environments, including the types of services and rates of data to be transported over the networks;
2. Identify performance and reliability requirements based on references to the Safety and Performance Requirements (SPR) and Interoperability (INTEROP) documents developed by RTCA SC-214 Data Communications, SC-206 Aeronautical Information Services (AIS) Data Link, SC-186 Automatic Dependent Surveillance-Broadcast, SC-217 (Airport mapping, terrain and obstacles) and others standards groups, as appropriate, to support future airport surface operations.
3. Define characteristics such as power class profiles, the network resource allocation scheme, and a standardized list of channel bandwidths and service partitions for the system to be used across the full range of airport classes and physical sizes;

4. Specify any other system characteristics that may be needed by designers, installers, manufacturers, service providers, and users of the networks. (For example, a specific request from SC-206 is to explore the feasibility of using the proposed link for terminal area MET data link exchange).
5. The Special Committee will develop Minimum Operational Performance Standards (MOPS) for ASWC equipment based on Aviation Conformance Standards that include:
 - 1) Protocol Conformance Testing
 - 2) Radio Conformance Testing
 - 3) Interference Compliance Testing

Other requirements include Safety and Performance Requirements and other functional and specialty requirements as defined in the DL COCR document.

- **EUROCAE Coordination** –
 - The EUROCAE Council has been consulted, and has established a Working Group (WG-82) on this subject in parallel with SC-223. (Luc Deneufchatel from the French DGAC and DSNA will chair this new Working Group.) The intent is that the proposed RTCA and EUROCAE committees will work together as a joint committee to develop a world-wide standard.
- **Additional Coordination** –
 - The Special Committee will coordinate with other organizations as necessary, such as:

FAA	Federal Aviation Administration
ICAO	International Civil Aviation Organization
EUROCONTROL	European Organization for the Safety of Air Navigation

 - The FAA and EUROCONTROL intend to develop a new action plan so that future work and harmonization activities can continue. As a part of the proposed Agreement, both organizations would provide periodic updates to the international community through the ICAO Aeronautical Communications Panel on the status of this technology and standards development work. The completed standards would be brought to ICAO for technical review and possible adoption. Additional coordination will be conducted with the Internet Engineering Task Force (IETF) which is responsible for updates to the IEEE 802.16e documents.
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| IEEE | Institute of Electrical and Electronics Engineers |
| EUROCAE | European Organization for Civil Aviation Equipment |
| ISO | International Organization for Standard |
| IETF | Internet Engineering Task Force |
| AEEC | Airlines Electronic Engineering Committee |

- **Initial Documentation -**

Documents	Intended Use
ITU Directive	Support Recommendation for SC
ICAO Commission Approval of FCS Recommendations	Support Recommendation for SC
ARINC 821 and 822	Background Guidance
DO-272	Background guidance on D-Taxi and D-Traffic applications
DO-308	Background guidance on AIS and MET Data Link Services
Various SC-186, SC-206, SC-214 and SC-217 working documents.	To provide background guidance for the D-Taxi, D-OTIS, D-Traffic, and other relevant airport surface applications.

TERMINATION:

This Special Committee will terminate its activities when the Program Management Committee (PMC) approves the committee's final document. Any change/extension of the committee's work program requires prior PMC approval.