Aviation Safety Program
Technical Accomplishment

Datalink Architecture Guidelines for TAMDAR, Tropospheric Airborne Meteorological Data Reporting.

POC: M Jarrell, GRC Date Completed: December, 2002

Relevant Milestone: TAMDAR Air-Ground & Air-Air Datalink Architecture Guidelines (Level III MS 2.4.2-11)

Shown: 2007-2015 datalink architecture guidelines for air-to-ground and air-to-air dissemination of TAMDAR weather information.

Accomplishment / Relation to Milestone and ETO: A key challenge to realizing TAMDAR is the datalinking, ground reception, and distribution of the airborne sensor data. In January 2002, NASA GRC and Johns Hopkins Applied Physics Laboratory through joint funding from the NASA AvSP and the FAA (under an Interagency Agreement on weather datalink research) completed a preliminary technical analysis of potential TAMDAR datalink architectures with a 2003 implementation. Milestone 11 was an expansion of the January 2002 effort for 2007-2015 implementations. Three datalink approaches were investigated: ground-based, satellite-based (SATCOM), and a hybrid mix of ground/satellite for GA and regional aircraft. Datalink requirements were confirmed and developed architectures were ranked based on ability to meet the 2007/2015 time frame and any additional new requirements. Three systems appeared viable for SATCOM: 1 GEO (Inmarsat) and 2 LEO (Globalstar and Iridium). Three systems appeared viable for radio line of site: 1 ADS-B broadcast (UAT) and 2 cellular (Aircell and Magnastar). These systems all provide a higher capacity for information transfer than required by TAMDAR with the air-air requirement being the most difficult. ADS-B, UAT provides an air-air capability while the other systems employ ground processing and retransmission in order to satisfy the air-air requirement .

Future Plans: Preliminary Integrated Datalink Flight Demonstration Architecture Definition (1Q04); Flight Demonstration Datalink Architecture & System Interface Final Definition (3Q05).

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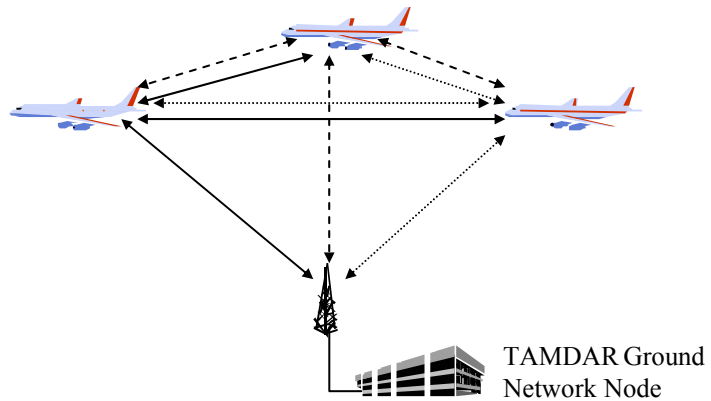
Requirements

Scoring Category	Summary Requirements
Air-to-Ground Capacity	transmit: 4.2 bps - 42 bps
Air-to-Air Capacity	transmit: 4.2 bps - 42 bps receive: ~2-3 kbps
Platform Constraints	Appropriate for GA/regional aircraft
Coverage	CONUS
Latency	1 minute
Cost	under $5000 NRE; minimum recurring



TAMDAR Connectivity (Functional)

System Scoring Summary

High Viability		Potentially Viable		Not Viable	
System	**Type**	**System**	**Type**	**System**	**Type**
Inmarsat	GEO SATCOM	ICO	GEO SATCOM	GATElink	LOS Broadcast
Iridium	Non-GEO SATCOM	Ellipso	Non-GEO SATCOM	DARC	LOS Broadcast
Globalstar	Non-GEO SATCOM	Orbcomm, Leo One, And Final Analysis	Store & Forward SATCOM	VDL Mode 2,3,4	LOS Broadcast, Addressable, Addressable
Aircell	LOS Cellular	Spaceway	GEO SATCOM	HFDL	LOS Addressable
Magnastar	LOS Cellular	Teledesic	GEO SATCOM	3G/4G Cellular	LOS Cellular
UAT	LOS Broadcast	1090 ES	LOS Broadcast	Mobitex	LOS Cellular
		AAN	LOS Addressable	ACARS	LOS Addressable