

# Ground System Architectures Workshop



**"Harmonization: Challenges and Opportunities"**

Sheraton Gateway Hotel, Los Angeles

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## Cloud Computing for Spacecraft Operations

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# Executive Summary

- Cloud computing is a game changer, bringing a fundamental shift in Information Technology Management
  - Lower cost of IT will accelerate innovation
  - This will have a great influence on implementation, procurement, and utilization of ground systems
- The working group consists of:
  - Presentations, demonstrations, and discussions of key principles of cloud computing
  - Discussions of the unique issues with the use of cloud computing to deliver ground systems for spacecraft operations
- The goal: Develop a roadmap for successful migration to a cloud environment in harmonization with the existing systems and processes

# Working Group Format

- Review of the state of the art, led by Panelists
- Presentations from cloud providers, ground system providers, and ground system users
- Demonstrations on the use of cloud computing
- Discuss the benefits, challenges, and misconceptions in migrating to a cloud environment
- Brief survey of the participants on the status of their journey to the adaptation of cloud
- Development of a roadmap for successful implementation of the cloud environment
- Identification of the Top 10 things to be considered for a successful implementation of cloud

# Key Questions

- Cloud computing for ground systems: what is the state of the art?
- What are the benefits and challenges to embrace cloud computing? What are some misconceptions?
- Which components (work loads) of ground systems are better suited for a cloud environment?
- Which phases of ground system lifecycle (development, testing, production) are well suited for the cloud?
- What are the enablers required for cloud computing in spacecraft operations to become a reality?
- How can cloud computing support harmonization of ground systems?

# Key Participants

## Panelists

Justin Boss	Integral Systems, Inc
Ted Hessler	Sirius XM Radio Inc
Brad Kizzort	Harris Corporation
Craig Lee	Aerospace Corporation
Knut Tjonneland	Intelsat

## Presenters

Doug Barnhart	General Dynamics C4 Systems
Jeremy Jacobsohn	GMV Space Systems, Inc
Emily Law	NASA JPL
Bill Lowry	Terremark
Dan Mandl	NASA GSFC

## iCORE Demo

iCORE: A cloud-based framework and incubator

Unclassified demo on Amazon EC2 by Nehal Desai, The Aerospace Corporation

## Terremark/ISI Demo

Implementation of Epoch ground control system on Terremark Enterprise cloud

Demo by Bill Lowry, Terremark and Mark Walker, ISI