

The Status of Ka-band Communications for Future Deep Space Missions

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Abstract

Over the past decade, JPL's Telecommunications and Mission Operations Directorate has invested in a variety of technologies, targeted at both the flight and ground sides of the communications link, in an effort to make Ka-band (32 GHz) a viable choice for future deep space missions. Driving this effort is the realization that moving from the current X-band downlink frequency up to Ka-band offers roughly a four-fold performance improvement, providing a low-cost path for increasing the aggregate capacity of NASA's Deep Space Network in anticipation of the need to support many more small, low-cost planetary missions. On the spacecraft, future radio systems, starting with the Small Deep Space Transponder, will offer the option of Ka-band exciters for downlink telemetry. Novel Ka-band antennas offer very high gain in low-mass, conformal packages. Ka-band Solid State Power Amplifiers have been demonstrated; however, significant improvements in both total output power and power-added efficiency are needed to achieve the full benefit of Ka-band's performance advantages. On the ground, DSN's new generation of 34-meter beam waveguide antennas have demonstrated both the aperture efficiency and precision pointing necessary to support Ka-band reception; current efforts are focused on assessing the potential utility of the 70m antennas at 32 GHz. Multi-year radiometry at all three DSN sites provides a statistical assessment of Ka-band atmospheric effects. And a series of flight demonstrations, including the current Ka-band Link Experiment on the Mars Global Surveyor spacecraft, have validated our end-to-end understanding of the communications link. This report presents a status report on the readiness of flight and ground technologies to support Ka-band telemetry for future missions and makes specific recommendations for targeted developments to fully exploit the potential of Ka-band.

PROCEEDINGS

A copy of the Conference Proceedings will be provided in the Conference kit at the Registration.

HOTEL ACCOMMODATION

The Sorrento Palace will provide the room reservation in the same Hotel and also in a three stars Hotel if desired.

The Hotel rates and the instructions for payment are indicated in the enclosed *Hotel Booking Form*.

Deadline for hotel booking: August 20, 1997.

Reservations received after August 20 will be accepted if rooms are still available.

Cancellation

If hotel reservation is cancelled before August 20, 1997, the received deposit will be refunded (deducting bank charges). After this date, the deposit will be kept.

SORRENTO

Perched on a terrace overlooking the sea, halfway along the peninsula separating the Bay of Naples and the Gulf of Salerno, Sorrento is an ancient town going back to Neolithic period.

The charm of ancient temple ruins, the beauty of the scenery and the mildness of the climate have always been an inspiration for poets and artists (Byron, Goethe, Dumas, Stendhal, Dickens, Shelley, Wagner, Tolstoj, Ibsen, etc.).

In close reach to Sorrento are splendid locations such as Positano, Amalfi and Ravello and attractive islands such as Capri and Ischia in the Bay of Naples. With its proximity to the city of Naples and fascinating archeological sites such as Pompei, Paestum and Herculaneum, Sorrento is the famous resort and center for many artistic and cultural events, such as international film festivals.

Directions to Sorrento

Sorrento can be reached from Naples (50 km) by bus, train (*Circumvesuviana*) and hydrofoil.

The Airport of Naples Capodichino is directly connected with the main European cities such as London, Paris, Frankfurt, Munich, Marseille, Athens, Rome and Milan.

Climate

The temperature in Sorrento at the middle of September ranges from a low of 20 degrees to a high of 28 degrees Celsius.



THIRD Ka BAND UTILIZATION CONFERENCE

September 15 - 18, 1997
Sorrento, Italy

Announcement
and
Call for Papers

Third Ka Band Utilization Conference

The interest shown by the participants in the attendance of the sessions, the quality and variety of papers and the favorable reaction by many of the participants have been gratifying and have reinforced our belief that the Ka Band Conference should continue to be the forum for presenting the activities of this important segment of the satellite industry.

Inflated by interest shown at the Second Conference, and as announced then, the Organizing Committee and the Istituto Internazionale delle Comunicazioni (IIC) have decided to hold the **Third Ka Band Utilization Conference** on **September 15-18, 1997** in **Sorrento, Italy**.

The Conference is expanded in scope referring to the last editions. In order to provide an open forum and encourage wider participation, paper contributions are solicited in the area listed below:

New Ka-Band systems

Ka-Band experimental results

New developments in Ka-Band components

Interoperability with other satellite systems and terrestrial systems

Regulatory issues:

- non-civilian users of Ka-Band spectrum

- plans for developments of new spectrum for satellites

Workshop on High Data Rate (DHR) Systems

The ITALSAT Propagation Experiment Workshop

User application forum

Also we hope to be able to present early results achieved by new users of the Ka Band and further details on the progress of the announced global Ka Band systems. Of special interest will be papers detailing some of the technical aspects of the system architectures, user interfaces and protocols, on board switching systems and developments in the all important users terminal area.

CALL FOR PAPERS

- Abstracts of 500 words or less are requested by **March 31, 1997**.
- Authors will be notified of acceptance of the abstracts by **April 30, 1997**.
- Final copy ready papers will be due by **June 30, 1997**.

ORGANIZATION / CONFERENCE SECRETARIAT

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GENERAL INFORMATION

CONFERENCE LOCATION

The Conference will be held at the **Congress Center of the Sorrento Palace Hotel**, Sorrento, via S. Antonio 13. Phone +39 81 8784141, fax +39 81 8783933.

REGISTRATION

Registration fee (before July 31, 1997): **Lit. 600.000**
Late registration fee (after July 31, 1997): **Lit. 700.000**

Payment

The fee should be paid in Italian Lire as follow:

- **by bank cheque**, payable to Istituto Internazionale delle Comunicazioni, to be mailed with the enclosed **Registration Form** to:

IIC - Istituto Internazionale delle Comunicazioni
Via Pertinace - Villa Piaggio, 16125 Genova, Italy

- **by bank transfer**, free of bank charges, to:

IIC - Istituto Internazionale delle Comunicazioni
Account No.10543/80 - Banca CARIGE, Sede Centrale
Bank codes: ABI 06175-4, CAB 01400-1
via Cassa di Risparmio 15, 16123 Genova, Italy

- **by credit cards** (VISA, Mastercard, Eurocard).

Cancellation

Registration fee (75%) can be refunded only if notification is given in writing before August 31, 1997. After this date, fee will not be refunded and the Conference Proceedings will be mailed.

Registration Desk

The Registration and Information Desk will be open in the lobby of the Conference Hall on:

Sunday, September 14	17:00 - 19:00
Monday, September 15	08:00 - 18:00
Tuesday, September 16	08:00 - 18:00
Wednesday, September 17	08:00 - 18:00
Thursday, September 18	08:00 - 12:30