

N91-11956

ACTS PROPAGATION PROGRAM

F. Davarian
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, CA 91109

Introduction

The Advanced Communications Technology Satellite (ACTS) Propagation Program is organized to fulfill certain needs and requirements of the ACTS community. It is hoped that issues related to propagation effects in the context of ACTS experiments can be addressed and resolved by this program.

The objectives of the ACTS Propagation Program are included in but not limited to the following:

- o Plan for propagation measurements and studies using ACTS.
- o Organize propagation experimenters who want to use ACTS into one group.
- o Develop observation stations for ACTS propagation measurements.
- o Supervise data collection, analysis, and ensure uniformity of data recording among various experimenters.
- o Assist the ACTS Program Office to carry out its objectives.

This program is organized and managed by the NASA Propagation Program at JPL. Financial support for this program is provided by NASA.

Planning

Planning for the ACTS Propagation Program is done cooperatively by many contributors including:

- o NASA Propagation Program
- o NASA ACTS Program
- o Propagation Community
- o ACTS Experimenters

The main vehicle for planning is the ACTS propagation studies workshops. Planning for the ACTS propagation terminal was addressed in the First ACTS Propagation Studies Workshop, November 28-29, 1989. The workshop was convened to develop a plan for the ACTS Propagation Program. At the end of two days, the participants delivered a set of recommendations regarding propagation studies and experiments using ACTS. These recommendations covered a range of topics including the configuration and the number of propagation terminals.

Thirty-seven people attended the workshop. Table 1 shows the organizational distribution of the attendees. The workshop presentations were compiled in a document. Three hundred copies of this document have been distributed since.

The workshop participants provided guidelines regarding the ACTS propagation stations. Furthermore, due to the approaching spacecraft launch date and the satellite's short life span, it was strongly suggested that the work on the development of the terminals start without delay. The workshop participants agreed that it would be best to collect propagation data for a minimum of three years, an objective that can be achieved only if the terminal development effort starts immediately.

A preliminary set of observation locations was proposed during the workshop. Table 2 shows these locations with candidate hosts for these stations at some of the locations.

In response to the workshop recommendations, a plan was put forth for developing nine observation stations. This plan consists of two developmental parts: terminal prototype and experimental terminals. With the May 1992 launch date for ACTS, the experimental terminals must be ready for shipping by July 1990. Therefore a terminal development schedule with a July 1992 delivery date was produced which is shown in Figure 1. This schedule is a preliminary one and its final form will be presented in the next ACTS Propagation Studies Workshop in November 1990. Table 3 shows a preliminary cost estimate for the observation stations.

Observation Station

Each observation station will be capable of making 20/30 GHz beacon and radiometric measurements. Furthermore meteorological data, such as point rain rate, ambient temperature and humidity, will be recorded. Each station will be equipped with a data acquisition system with capability to process and display data.

Data Collection and Analysis

The observation stations will be loaned to volunteer organizations for data collection. The collected data will be put in a depository for centralized processing and analysis. A small amount of funding will be available to support host organizations for maintaining the observation stations and for data collection. A reasonable supply of spare parts will be kept at JPL for maintenance and repair of the observation stations.

Summary

The ACTS Propagation Program is an umbrella organization responding to the needs and requirements of the ACTS propagation community. This program is organized by the NASA Propagation Program at JPL and is funded by NASA. Planning for ACTS experiments is the prime objective of this program. About nine observation stations will be developed under this program, which will be loaned to experimenters for propagation measurements. This program will supervise data collection and analysis. The findings of the ACTS propagation campaign will be documented in a report and distributed to the propagation community.

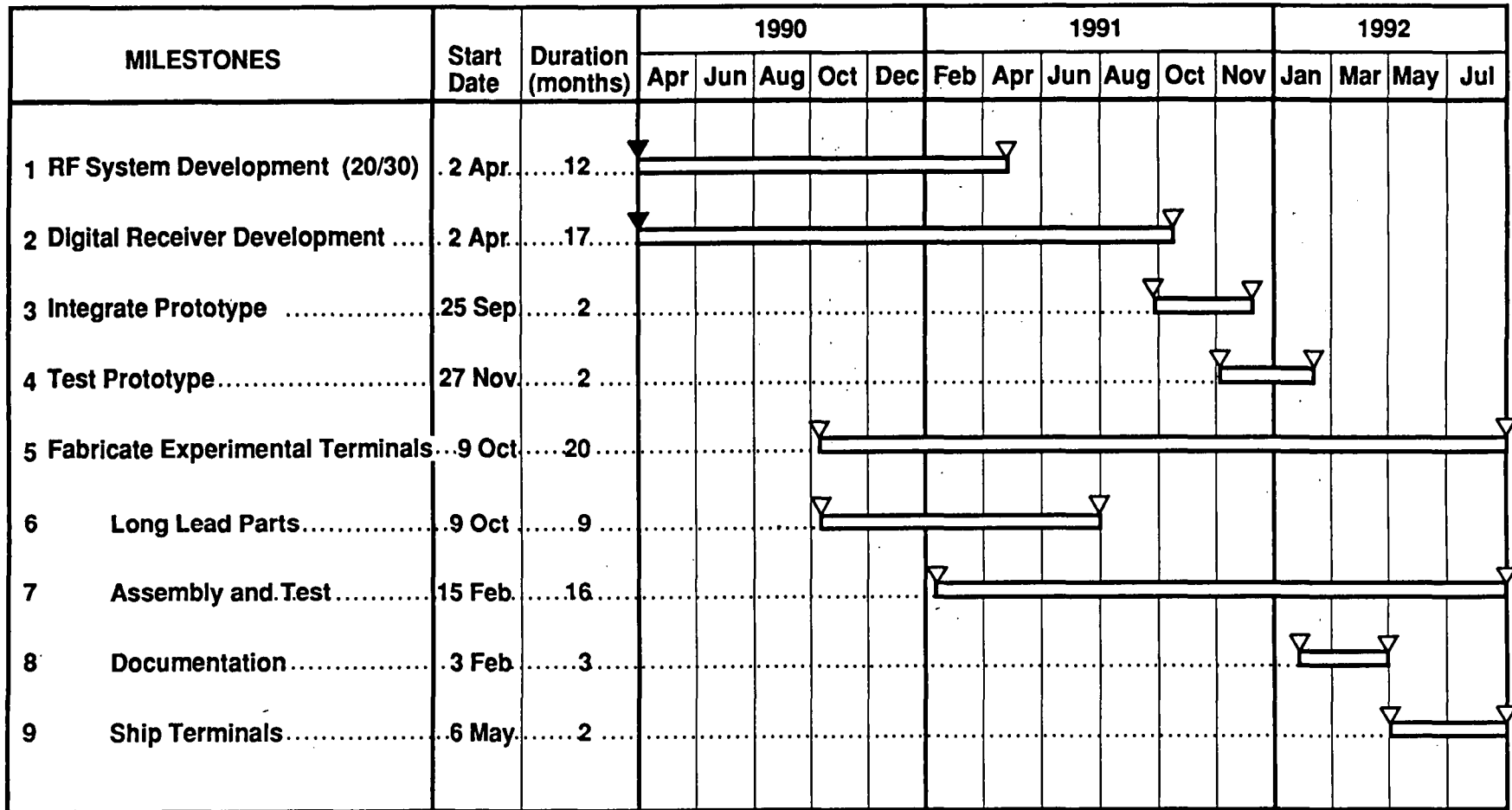


Figure 1. ACTS Experimenter's Terminal Development Schedule

Table 1. Organizational Distribution of Workshop Attendees

Organization	Attendees
NASA	6
JPL	6
University	12
Government	3
Others	10

Table 2. Preliminary Observation Locations with Candidate Hosts

Climate Zone	Institution	Location
B2	NOAA/WPL	Colorado
C	?	Western Washington
D1	Michigan Tech	Michigan
D1	Dartmouth College	New Hampshire
D3	?	Tennessee/North Carolina
E	?	Florida
F	JPL	California

Table 3. Preliminary Cost Estimates per Terminal

Parts & Materials	
Meteorological Equipment	10,000.00
Antennal Subsystem (Prodelin)	8,500.00
RF Subsystem	24,000.00
IF Subsystem	6,000.00
Base Band Subsystem	12,000.00
Computer/DAS/UPS	5,000.00
Total Parts & Materials	<u>65,500.00</u>
Shrinkage:	X 1.05
	<u>68,800.00</u>
JPL Procurement:	X 1.15
	<u>79,100.00</u>
Labor:	25,000.00
Total Mfg. Cost:	<u>104,100.00</u>
Spare Assemblies:	X 1.20
	<u>124,900.00</u>
Cost Uncertainty	X 1.20
Total Cost per Terminal (9 ea.)	<u><u>\$149,900.00</u></u>

Notes: •Cost does not include site preparation or shelters
 •Price is FOB Pasadena
