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April 20, 2001

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

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Magalie Roman Salas
Secretary
Federal Communications Commission
445 12th Street, S.W.
Room TW-A325
Washington, D.C. 20554

EX PARTE OR LATE FILED

EX PARTE
Re: IB Docket No. 99-81 (2 GHz Service Rules)

Dear Ms. Salas:

The chief technical officer of ICO Services Limited ("ICO"), Paul Regulinski, on April 12, 2001, presented a technical briefing to staff members of the International Bureau, Wireless Telecommunications Bureau, Office of Engineering and Technology, and Office of the General Counsel addressing ICO's proposal to allow 2 GHz mobile satellite service ("MSS") providers to integrate an ancillary terrestrial component ("ATC") into their satellite systems. The cc list to this letter identifies the FCC staff participants in the meeting. In addition to Mr. Regulinski, ICO was represented by Larry Williams, Suzanne Hutchings, Gerard Salemme and the undersigned. The essential elements of Mr. Regulinski's presentation are set forth in Attachment A.

ICO emphasized that the approval of ATC will help revive an industry that offers multiple benefits to consumers, including advanced digital services to the 88 percent of the United States that has no terrestrial broadband service of any kind, wireless or wireline, and enhancement of public safety systems. Because MSS signals cannot penetrate buildings or provide adequate coverage in many urban areas, the low demand for MSS services to date have made it impossible for satellite providers to achieve the economies of scale required for viable commercial operations. But utilizing a limited number of "gap filler" base stations in some urban markets, MSS providers will be able to extend the availability of their systems to indoor and urban environments, making more efficient use of satellite spectrum in areas where it otherwise would remain unused.

ICO stressed that the ATC terrestrial service would not compete directly with existing terrestrial wireless networks in urban markets. Rather ICO's marketing focus will be on the provision of global services and coverage of now underserved areas.

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In response to a question as to whether it would be more spectrally efficient to segment the MSS band between satellite and terrestrial operations, ICO noted that ATC offers much more efficient and intensive spectrum usage than band segmentation. An MSS system integrating an ATC segment will allow the dynamic assignment of customer traffic to either the satellite component or the terrestrial component, depending upon the customer's location, the time of day, and the network resources available. This in turn will enable more efficient reuse of spectrum in both urban and rural areas because the ATC will accommodate urban traffic in a way that enhances the amount of spectrum available on the satellite portion of the network, freeing up more spectrum and system resources for rural customers. Unlike in a band segmentation environment, an integrated satellite terrestrial network will allow the system to actively and efficiently manage all available frequencies on a nationwide basis.

An original and one copy of this letter and attachment have been submitted to the Secretary of the Commission for inclusion in the public record, as required by Section 1.1206(b) of the Commission's rules.

Respectfully submitted,

Cheryl A. Tritt
Counsel to ICO Services Limited

Attachment

cc: Breck Blalock
Geraldine Matise
Tom Derenge
Michael Pollak
Charlene Lagerwerff
Tom Stanley
Julie Buchanan
Cecily C. Holliday
Paul Locke
Louis Peraertz
Jim Ball
John Martin
Won Kim
Kathleen Ham
Nese Guendelsberger

MSS System with Ancillary Terrestrial Component (ATC)

19th April 2001

Presented to FCC

Paul Regulinski

ICO Global Communications

Introduction

1. Overview
2. Satellite/ATC Interference
3. Satellite/ATC Interference Mitigation
4. Integrated System with Satellite Component and ATC

ICO

What are we trying to achieve?

- Create an economically viable MSS business
  - global, mobile, high quality voice and data services
  - extension of service to rural, remote, maritime, aeronautical markets

- Help revive an MSS industry that has many potential benefits:
  - Extension of service to rural and under-served areas
  - Augmentation of existing Public Safety Systems

ICO

What is the problem?

- Problem characteristics of Current MSS Systems
  - severely limited urban and in building coverage
  - large, unattractive, expensive user equiptment (cell phones)
    - low quantities and industry uncertainty drives low vendor investment
    - SC link physics
  - low subscriber quantities
  - low capacity density capabilities
    - due to large frequency re-use geographic regions inherent to space systems

And

- Large up front capital costs, required years before first subscriber obtained.

Confidential & Proprietary to ICO Global Communications ICO Technical Comm 28032001.ppt

ICO

What is the problem (continued)?

- Additionally, today's spectrum utilization practices are inefficient
  - current terrestrial systems do not use their spectrum in many locations
    - remote, oceans, aeronautical, other low trafficked areas
  - MSS systems effectively cannot use their spectrum in built up areas due to building, tunnel, etc., blockage

ICO

What is the solution?

- ICO proposes utilizing terrestrial base stations in urban areas.
  - ICO user would access services via the BSs, or Ancillary Terrestrial Component (ATC) when "in town", and via the Satellite Component (SC) otherwise.
  - Coverage in town would be such as to allow in building usage.
  - If spectrum re-use is permitted, this would maximize spectrum efficiency and enhance customer quality of service.

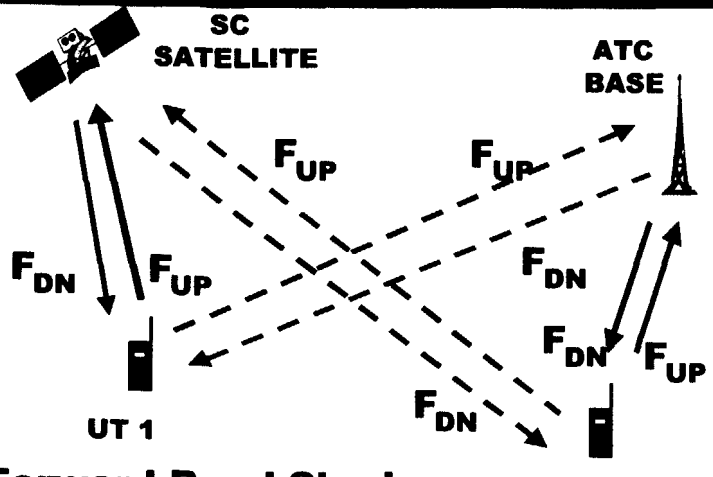
ICO

Products & Services

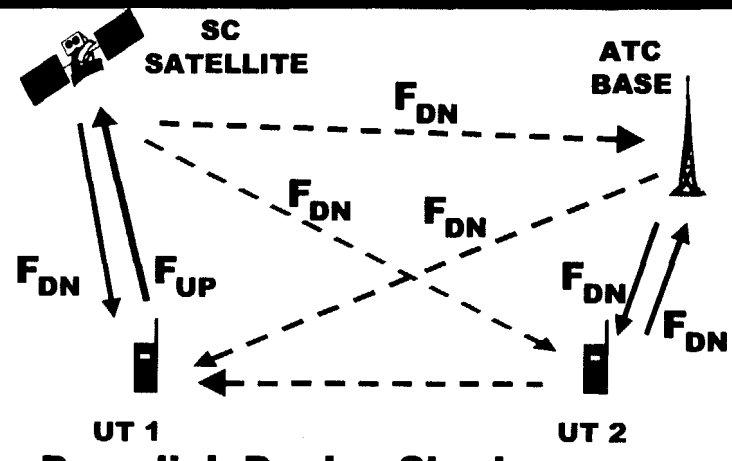
- Cellular-type voice services
- "Always-on" packet services
- "Push To Talk" (PTT) dispatch services
- Applications, including Public Safety
- "Seamless" satellite/ATC access

ICO

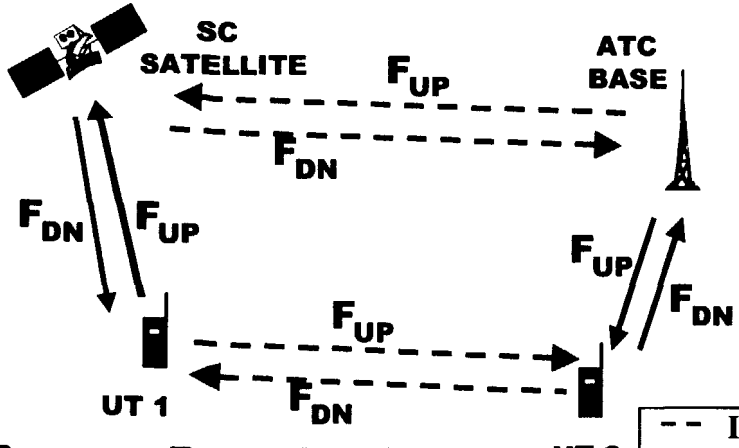
Satellite/ATC Modes of Use



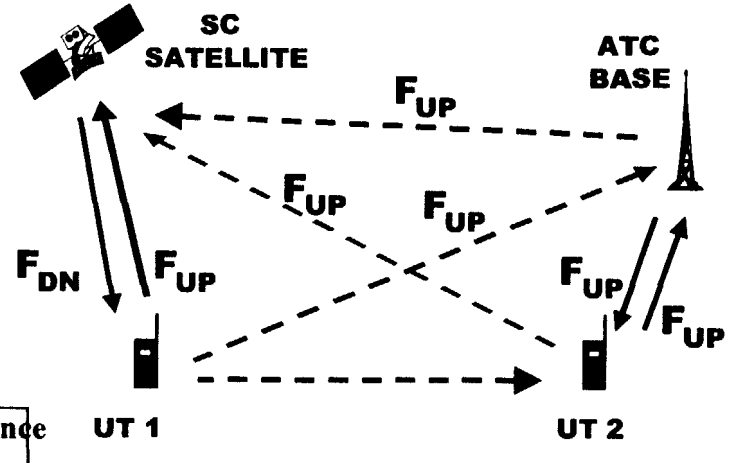
Forward Band Sharing Mode



Downlink Duplex Sharing Mode



Reverse Band Sharing Mode



Uplink Duplex Sharing Mode

-- Interference
— Desired

Impact Assessment

Spectrum Sharing Modes

of sharing	Interference Mode an Impact
[redacted]	ATC Base Into UT in SC Mode - **32 km exclusion distance between ATC Base and SC UT**
[redacted]	SC Satellite Into UT in ATC Mode **- 1.1% decrease in ATC cell coverage area per operating SC carrier**
[redacted]	UT in SC Mode Into ATC Base **- 32 km exclusion distance between ATC Base and SC**
[redacted]	UT in ATC Mode Into SC Satellite **- 38,900 Outdoor ATC UTs @ 20 mE in a nominal spot beam. No practical limit to indoor ATC UTs.**
erse Band [redacted]	ATC Base Into SC Satellite - **7850 ATC UTs @ 20 mE in a nominal spot beam.**
erse Band [redacted]	SC Satellite Into ATC Base **- 1 % decrease in ATC cell coverage area per operating SC carrier**
erse Band [redacted] erse Band [redacted]	UT in ATC (SC) Mode Into UT in SC (ATC) Mode **- 11 km exclusion distance between ATC UT and SC UT**

ICO

Mitigation Techniques

- Dynamic Resource allocation to the SC and ATC using Integrated Resource Management System, additional complexity in exchange of spectrum efficiency
- ATC cell size planning and improved base antenna performance
- Usage of Adaptive Dual Mode User Terminals
- Interference cancellation techniques
- User Equipment Assisted Resource Allocation using Integrated Resource Management System

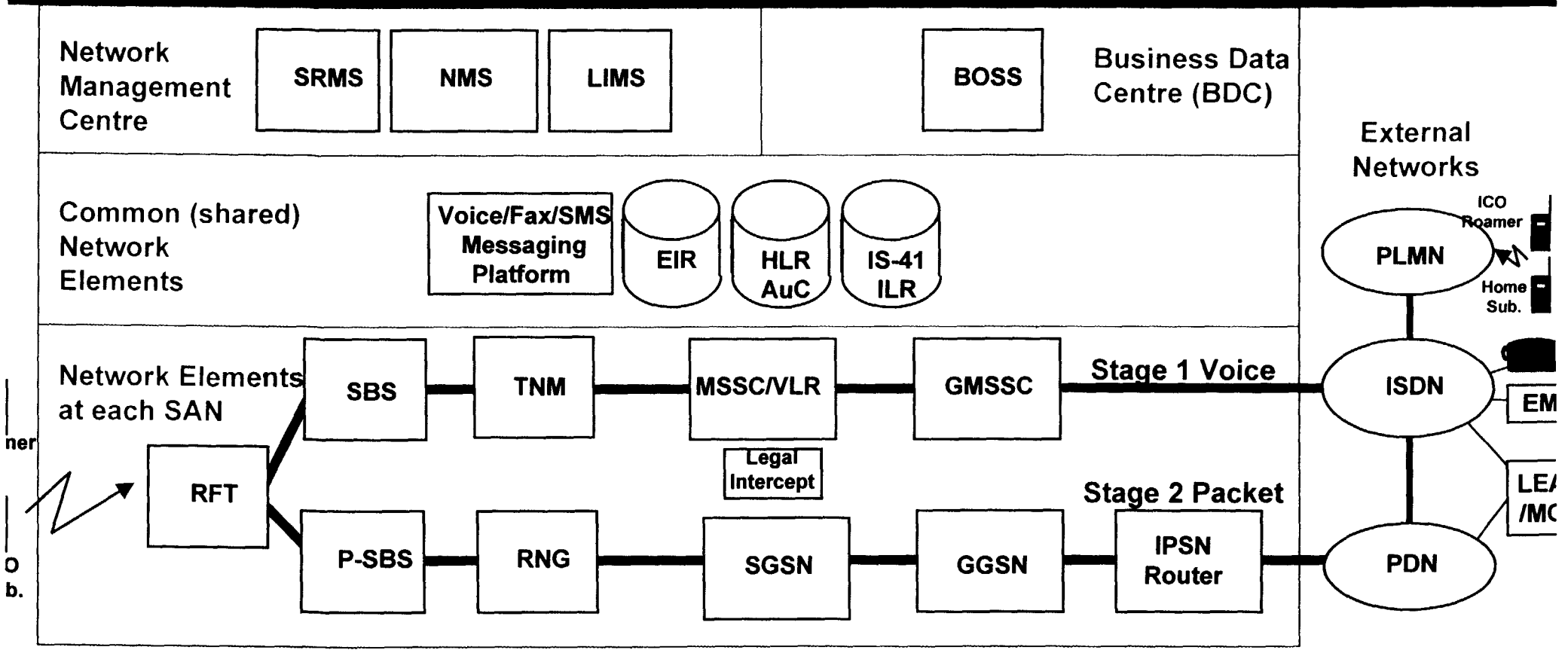
ICO

ATC/SC Architecture components

- ICO / SC Considerations:
  - Existing voice (stage 1) architecture
  - Current packet data (stage 2) architecture
  - Potential Enhancements for ATC (e.g. PMR)
- ATC Considerations:
  - Existing GSM, CDMA, iDEN voice architectures
  - CDMA 1xRTT architecture for data

ICO

SC (ICO) Architecture



uC = Authentication Centre
OSS = ICO Business Operations Support System
R = Equipment Identity Register
MG = Emergency Call Centre
-41 ILR = Inter-working Location Register (GSM/IS-41)
GSN = Gateway GPRS Support Node
MSSC = Gateway MSSC
LR = Home Location Register

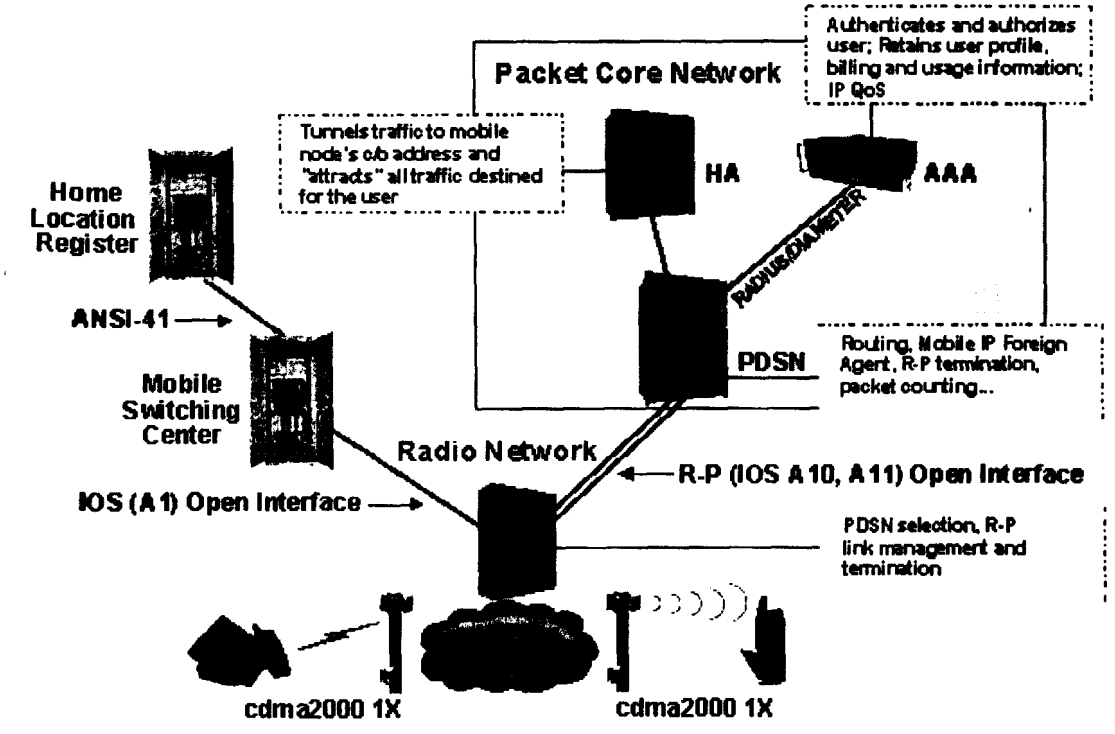
IPSN = IP Service Network
ISDN = Integrated Services Digital Network
LEA/MC = Law Enforcement Agency/Monitoring Centre
LIMS = Legal Interception Management System
MSSC = Mobile Services Satellite Switching Centre
NMC = Network Management Centre
NMS = Network Management System
PDN = Packet Data Network

PLMN = Public Land Mobile Network
RFT = Radio Frequency Terminal
RNG = Radio Network Gateway
(P-)SBS = (Packet-) Satellite Base Station
SGSN = Serving GPRS Support Node
SRMS = Satellite Resource Management System
TNM = Terrestrial Network Manager
VLR = Visitor Location Register

ICO

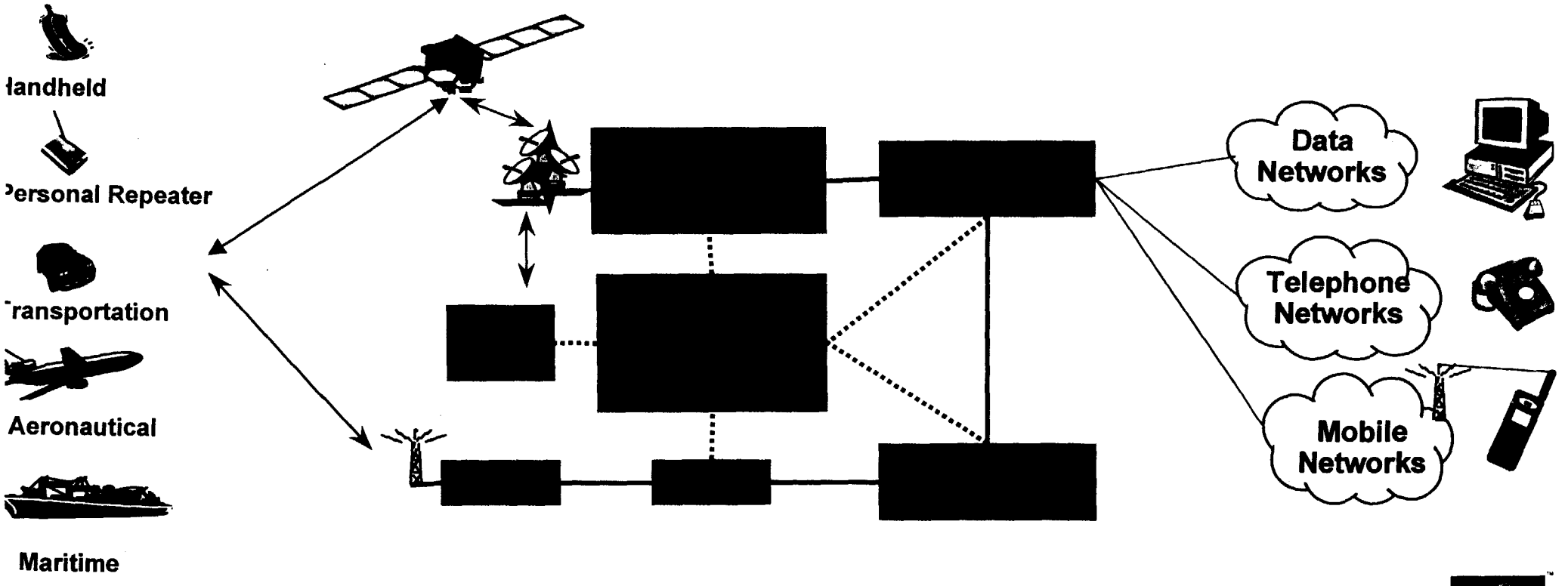
ATC Component Architecture

cdma2000 Packet Core Network with Mobile IP



ICO

Integration of Satellite/ATC Components



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