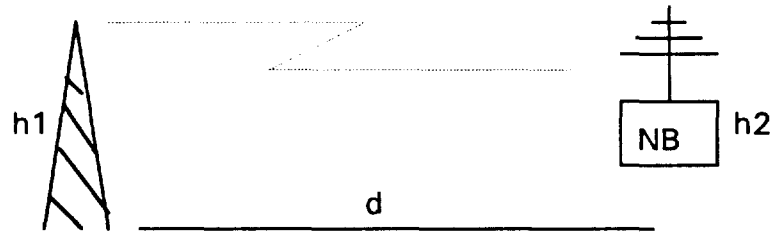
Local Area and Wide Band Systems-2

WB Fixed transmission blocking Local Area fixed RX



For h1 = 300ft, h2 = 30ft

For Local Area Pt = 30W (3W with 10dB antenna)
WB Pt = 5000W (Pinpoint) d = 1.13 to 2 miles
WB Pt = 500W

For Local Area Pt = 200mW
WB Pt = 500W d = 4.0 miles

For Local Area Pt = 50mW
WB Pt = 500W d = 5.65 miles

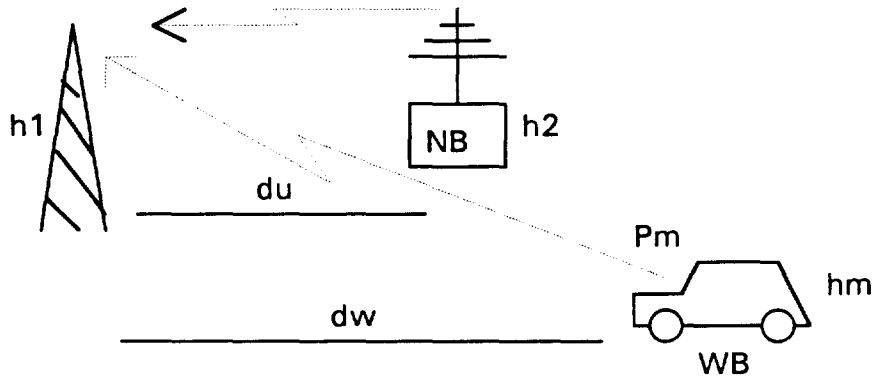
Pinpoint Appendix B, for h1 = 100ft, h2 = 10ft

For Local Area Pt = 30W (3W with 10dB antenna)
WB Pt = 1000W d = 0.19 miles

Proposal to reduce Pt to 200 or 50mW will cause significant problems to Local Area systems.

Local Area and Wide Band Systems-3

Local Area TX blocking WB fixed RX



Assume Local Area TX = 3W with 10dB antenna
For h1=300ft, h2=30ft, hm=6ft

Pm =	40W	10W	2.5W
JM	dw/du	dw/du	dw/du
5	*1.06*	0.75	0.53
14	1.78	1.26	0.9
20		1.78	*1.35*

Big Potential Problem
Note Teletrac 2.5W better than Pinpoint 40W

Pinpoint Appendix B

h1=100ft, h2=10ft, hm=10ft, Pm=60W dw/du = 2.8 *(Not worse case)*

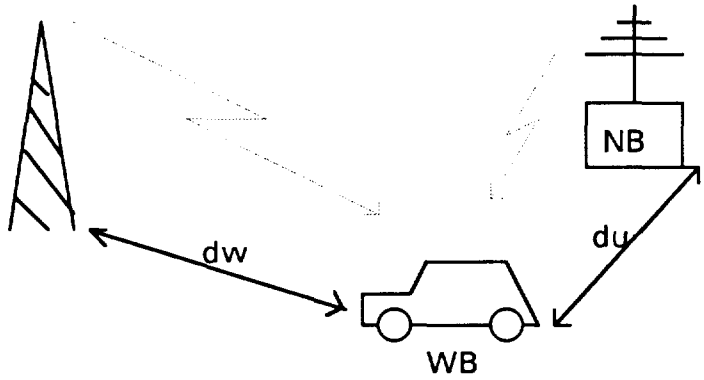
For local area site placed 2 miles away,
mobile 5.6miles is blocked.

Note: Pinpoint's figures show dw/du=7.5 this equates to a JM of 21dB. Code length 127 gives PG of 21dB, JM is much less.

Problem was not addressed in Pinpoint's demonstration

Local Area and Wide Band Systems-4

Local Area TX blocking WB Mobile RX



For 500W WB fixed transmission, narrow band channel.

Local Area Power	= 30W	dw/du = 0.77
	= 3W	dw/du = 1.37

Problem easily avoided if the narrow band command channel frequency not the same as the Local area frequency.

Pinpoint Appendix B
For Pinpoint System, the command channel is spread spectrum over wide band. Local Area transmission will always be in band.

Pm=60W 10ft, Forward Link 1000W 100ft, Local Area TX 3W 10ft.
dw/du = 3.8

For local area site 2 miles from fixed site,
"black-out" area is 1 mile across.

Appendix B shows dw/du = 8
which relates to "black-out" area 0.5 miles across

For Pinpoint
spread spectrum forward link results in
definite 'black-out' area
not experienced by other systems.

PINPOINT

Parameters achieved at cost of bandwidth, jamming margin and transmitted power.

Selective analysis of interference.

- Has highest interfering transmissions, 40W mobile, 5000W fixed.
- Has lowest resistance to interference, (L=63 or 127, 2 or 4 bits per sequence).
- Has 'black-out' zone near local area systems.

Demonstration - tight layout, line-of-sight, high vehicle, did not address problems

Accuses Teletrac of "too low a mobile power level":

Teletrac	2.5W(34dBm)	Pinpoint	40W(46dBm)
	PG 27dB		PG 18dB or 21dB, -6 or -3dB
	Peff = 61dBm		Peff = 61dBm

??Hidden Antennas??

Accuses MobileVision of low data capacity:

240 channels 2400 and 8000kbps (one cost effective radio unit)
7800 bps on data on spread spectrum channel (with 14dB JM)
spectrum contained within 8MHz allocation

TIME SHARING - 1

PROPOSAL :

Direct Time Slicing used to allocate equal time to each system sharing the frequency band.

METHOD :

- **Accurate time of day common standard used e.g. GPS**
- **Forward scheduling of events to command responses only in own time slot.**
- **0.5 or 1 sec time slices.**
- **Not TDMA**

TECHNICALLY POSSIBLE for Location and Data

Voice presents a major problem

TIME SHARING - 2

TDMA efficient when

A - a common system data protocol is used
B - all users conform to a common standard.
C - a system controller manages the resource.

TDMA schemes usually use compression and expansion to supply constant data rate to users

This system is therefore simple "time slice"

PROBLEMS:

M : number of time slots per frame.

- Fixed number?
- How many?

Direct reduction in capacity of each service.

Time Slot

- How long?
- How accurate?

HOW IS IT REGULATED?

TIME SHARING - 3

WHAT HAVE WE GOT?

- Each system uses different data protocols.
- Each system uses different location burst time.
- Each system is independent.
- Each system has different basic parameters.

WHAT WILL TIME SLICING ACHIEVE?

- Each system reduced in capacity.
- Extra cost. Delay to deployment.
- Drastic reduction in system integrity (dependent on others)
- Less ancillary service, no voice - effectively kills a major market requirement.

RESULT

- Main Market Requirement is lost.
- Less incentive to invest in service
- Fewer Systems

MAJOR NEW SERVICE TO THE PUBLIC WILL BE LOST

TIME SHARING - 4

TELETRAC DOES NOT WANT IT
"insurmountable technical and econmic hurdles"

SOUTHWESTERN BELL DOES NOT WANT IT
(even though they see it as an adjunct to cellular)

PINPOINT WANTS 26MHZ!!
(local area systems, TDMA, Time Sharing)

MOBILEVISION DOES NOT WANT IT
(Destroys the ancillary services which are the real market requirement)

MAJOR NEW SERVICE TO THE PUBLIC WILL BE LOST

MOBILEVISION, L.P.
A METS Limited Partnership

Corporate Mission

Since its inception in 1984, METS, Inc. has been dedicated to providing services that benefit consumer and corporate users. MobileVision along with METS, Inc. has invested considerable resources and has performed intensive research, development and marketing. The goal of this work has been the deployment of a national wireless network that provides location capabilities seamlessly with ancillary data and voice communications.

METS has been a pioneer and innovator in the development of vehicle location and communications technologies for nearly 10 years. During that period, innovative systems were developed and deployed that benefited both consumer and commercial clients alike.

With its broad experience and expert vision along with considerable investment, METS formed MobileVision in 1991 to focus on products demanded by both the consumer and commercial market segments. Recognizing a need for cost effective automated location, data and voice communications products, work began to satisfy that need. Using new and innovative techniques, the MobileVision system has been developed to satisfy a broad range of market requirements for providing seamless location and information services in a cost effective manner.

METS/MobileVision's corporate offices are located in Indianapolis, IN. Research and Development facilities are located in Boca Raton, FL and Los Angeles County, CA. METS is privately held and is the General Partner of MobileVision, L.P. Funding has primarily come from private investors who are firmly committed to the MobileVision goal of a nationwide network that provides seamless integration of location, data and voice services. They also share in the vision created by

MobileVision of providing products and services that enhance individual safety and promote productivity and national competitiveness.

MobileVision's goal to deploy a nationwide wireless network is being realized. As operator of the network, MobileVision has already deployed systems to three major metropolitan areas including Washington, D.C., Chicago, IL and South Florida (Boca Raton). Additional areas are being planned and will be on-line shortly. MobileVision expects that a nationwide network will be in place by 1996.

MobileVision is committed to providing services and equipment which enhance personal safety, increase productivity, enhance vehicle security and revolutionize the way in which fleet management services are provided. The keys to achieving this goal are cost effective products and services provided to consumers and commercial clients alike. Through its infrastructure and products, it will be possible to migrate computer power to the mobile environment thus fueling the "information highway" revolution in a way similar to the trend begun by the personal computer.

MOBILEVISION, L.P.
A METS Limited Partnership

Biographical Sketches

Donald R. Gray

- Chairman of the Board
- President
- Co-Founder

Mr. Gray, a co-founder and principal investor in METS, has been Chairman of the Board of Directors and President of METS since its inception. In 1984, Mr. Gray founded American Financial Resources, Inc. (AFR), which developed a sophisticated computer software system used by the finance departments of automobile dealerships. The principal assets of AFR were sold to a subsidiary of a major automobile manufacturer in 1987, at which time it ceased active operations. In 1978, Mr. Gray co-founded Crime Control, Inc. (CCI), a security alarm company which became publicly held in 1982. Crime Control was listed as the 19th fastest growing small company in INC. Magazine's Top 100 in 1982. Mr. Gray successfully negotiated 19 alarm company acquisitions during his term and the company grew from 7 employees and 300 customers based in Indianapolis, to 1,200 employees and over 55,000 customers with 19 offices and operations in 48 states and Puerto Rico. Mr. Gray served as Chairman and President of CCI. from inception until 1983, at which time he sold his interest in and resigned from all positions with that Company.

MOBILEVISION, L.P.
A METS Limited Partnership

Biographical Sketches

Anthony J. Spadafora

❖ Vice President, Technology

Mr. Spadafora joined the Company as a technical expert in October 1985. He has held his present position of Vice President - Technology since June 1988. Mr. Spadafora was a part of the early pioneering devlopment efforts for METS and continues today as system designer. with over 25 years of experieince in systems, hardware and software design, he has developed communications systems of all types. Prior to joining the Company, Mr. Spadafora served as president of RTX Telecomm, a telecommunications company building cost effective communciations equipment for consumer use. Mr. Spadafora also worked as an independent consultant to several companies engaged in product deelopment. Previous to his employment with RTX, Mr. Spadafora spent 10 years with Siemens, a large multi-national company, where he led a large team of software and systems engineering groups building both voice and data switching products for large and medium sized companies.

MOBILEVISION, L.P.
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Biographical Sketches

Basil E. Potter

- Vice President, Location Technology

Basil E. Potter joined the Company in May 1988 as Vice President - Transit. From 1984 to 1988, Mr. Potter was president of Basil E. Potter & Associates, Inc., a software development firm. While at such firm he developed the RoadRunner Fleet Management Software that was purchased by the Company in May 1988. Throughout his 32 years in the electronics industry, Mr. Potter has invented, supervised the design of, and installed a large number of advanced electronic systems. In 1971, Mr. Potter supervised the installation of an Automatic Vehicle Location System very similar to that to be utilized for in MobileVision's system. The entire LMS industry learned much about RF location techniques from this original work. Mr. Potter is one of the pioneers in achieving the FCC spectrum set aside for wide bandwidth LMS.

MOBILEVISION, L.P.
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Biographical Sketches

Graham K. Smith
❖ Director, Systems Research

Mr. Smith joined METS in 1992 as the Director of Systems Research. Prior to this Mr. Smith was the UK Coordinator, CCIR Study Group 9E and the Chairman of the EEA High Frequency Radio Communication Committee. Mr. Smith graduated with honors from London University in 1967 and was Chief Engineer in charge of research and development of radio communications systems for Plessey Radio Systems, part of the Plessey Company in the UK. Working subsequently for Plessey Military Communications division and later Siemens Plessey Defence Systems, Mr. Smith was instrumental in the design, development and marketing of many radio communications and location systems, including several UK, NATO and overseas defense contracts. In the early 80's Mr. Smith led a team that designed, developed and installed several city wide tracking systems that included both mobile and fixed tracking receivers. He also, in 1986, designed and carried out a large scale trial of a vehicle location system in London, England, based on an adaptive compass dead-reckoning navigation system. Mr. Smith has been responsible for many studies into the system parameters of large radio systems including spread spectrum location and the effects of radio propagation and interference.