E-LORAN USED FOR E-911 CALLER LOCATION ID

NAV08/ILA37

NAVIGATION CONFERENCE & EXHIBITION

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LORMEGA SYSTEMS INC.

FCC E-911 BACKGROUND

o **THE NUMBER OF 911 CALLS PLACED BY PEOPLE USING WIRELESS PHONES HAS RADICALLY INCREASED. PUBLIC SAFETY PERSONNEL ESTIMATE THAT ABOUT 50 PERCENT OF THE MILLIONS OF 911 CALLS THEY RECEIVE DAILY ARE PLACED FROM WIRELESS PHONES, AND THAT PERCENTAGE IS GROWING**

o **THERE ARE OVER 1,000,000,000 CELL PHONES BEING USED IN THE WORLD**

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FCC PHASE II E-911 RULES REQUIRE WIRELESS SERVICE PROVIDERS TO:

- o WITHIN SIX MONTHS OF A VALID REQUEST BY A PUBLIC SAFETY ANSWERING POINT (PSAP), PROVIDE MORE PRECISE LOCATION INFORMATION TO PSAPS; SPECIFICALLY, THE LATITUDE AND LONGITUDE OF THE CALLER. THIS INFORMATION MUST BE ACCURATE TO WITHIN 50 TO 300 METERS DEPENDING ON THE TYPE OF TECHNOLOGY USED.

- o BY SEPTEMBER 11, 2012, PROVIDE EVEN MORE PRECISE LOCATION INFORMATION, SPECIFICALLY, INFORMATION ACCURATE TO THE CLOSEST PSAP. THE FCC ESTABLISHED A FIVE YEAR PHASE-IN PERIOD FOR THIS REQUIREMENT TO ALLOW WIRELESS SERVICE PROVIDERS MORE TIME TO DEVELOP THIS CAPABILITY. WIRELESS SERVICE PROVIDERS MUST REPORT TO THE FCC ANNUALLY ON THEIR PROGRESS IN SUPPLYING THIS MORE ACCURATE LOCATION INFORMATION FOR PSAPS WITH PHASE II E911 CAPABILITY.

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WHY IS E-LORAN THE CHOICE FOR E-911?

o SIGNAL AVAILABILITY IN MOST ENVIRONMENTS & THROUGHOUT USA

o E-LORAN RECEIVER TECHNOLOGY IS AVAILABLE

o POSITION FIX POSSIBLE IN <30SEC

o GPS IS LIMITED IN MOST E-911 CALL LOCATIONS

o TRILATERATION WITH CELL TOWERS IS LIMITED IN ACCURACY

o ANTENNA CONSTRAINTS CAN BE RESOLVED

o E-LORAN IS THE ONLY VIABLE SOLUTION

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o CHALLENGING REQUIREMENTS

o RECEIVER CONFIGURATION

o BENEFITS

CHALLENGING REQUIREMENTS

o RAPID, ACCURATE CELL PHONE/RECEIVER

   LOCATION DATA RELATIVE TO PSAP LOCATION

o COMPACT, SENSITIVE ANTENNA DESIGN

   COMPATIBLE WITH 911 ENVIRONMENT

o PACKAGING OF EXISTING DESIGN

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RAPID, ACCURATE RECEIVER PERFORMANCE ENABLED VIA EXISTING DESIGN

o HI DYNAMIC RANGE, LOW TIME TO CONVERT, ANALOG TO DIGITAL CONVERTERS (ADC) – (CLOCK PERIOD < TOA RESOLUTION)

o DIG SIG PROC (DSP) ARRAYS AND MICROPROCESSOR BASED CODE

o DIGITAL FILTERING OF INTERFERENCE FROM CW AND CROSS-RATE SIGNALS DIGITAL FILTERING OF INTERFERENCE FROM CW AND CROSS-RATE SIGNALS

HIGH DYNAMIC RANGE ADCs

o   ADC SPEEDS UP TO 100 MHZ READILY AVAILABLE

o   20MHZ RATE IS DESIRABLE

o   NEEDED TO PROCESS PULSE BY PULSE LINEAR DATA

REDUCTION

o   COST HAS DROPPED DRAMATICALLY

DSP ARRAYS & INTEGRATED DEVICES

o **DIG SIG PROC** – **DSP PREPARES CONVERTED DATA PER**

   MICROPROCESSOR BASED ADC DATA REDUCTION ALGORITHMS

o **MICROPROCESSOR BASED SOLUTIONS FOR POSITION**

   LOCATION AND OUTPUT INTERFACE ALGORITHMS

o **PROGRAM MEMORY AND DATA RAM INTEGRATED WITH**

   MICROPROCESSOR

DIGITAL FILTERING PROVIDES

o   REJECTION OF SYNCHRONOUS & NON-SYNCHRONOUS
    INTERFERENCE FROM CW AND CROSS-RATE SIGNALS VIA
    LINEAR DATA PROCESSING

o   LIMITED REJECTION ANALOG FILTERS AND THEIR RELATED
    ADVERSE CONTAMINATION EFFECT UPON LEADING EDGE OF
    THE SAMPLED PULSE SHAPE

o   MUCH IMPROVED PULSE ENVELOPE/CYCLE RESOLUTION
    PERFORMANCE- 30 SEC TIME TO POSITION FIX

o   INTERFERENCE REJECTION RELIES UPON CURRENT PULSE
    PHASE CODING PATTERNS FOR MASTER & SLAVE SIGNALS

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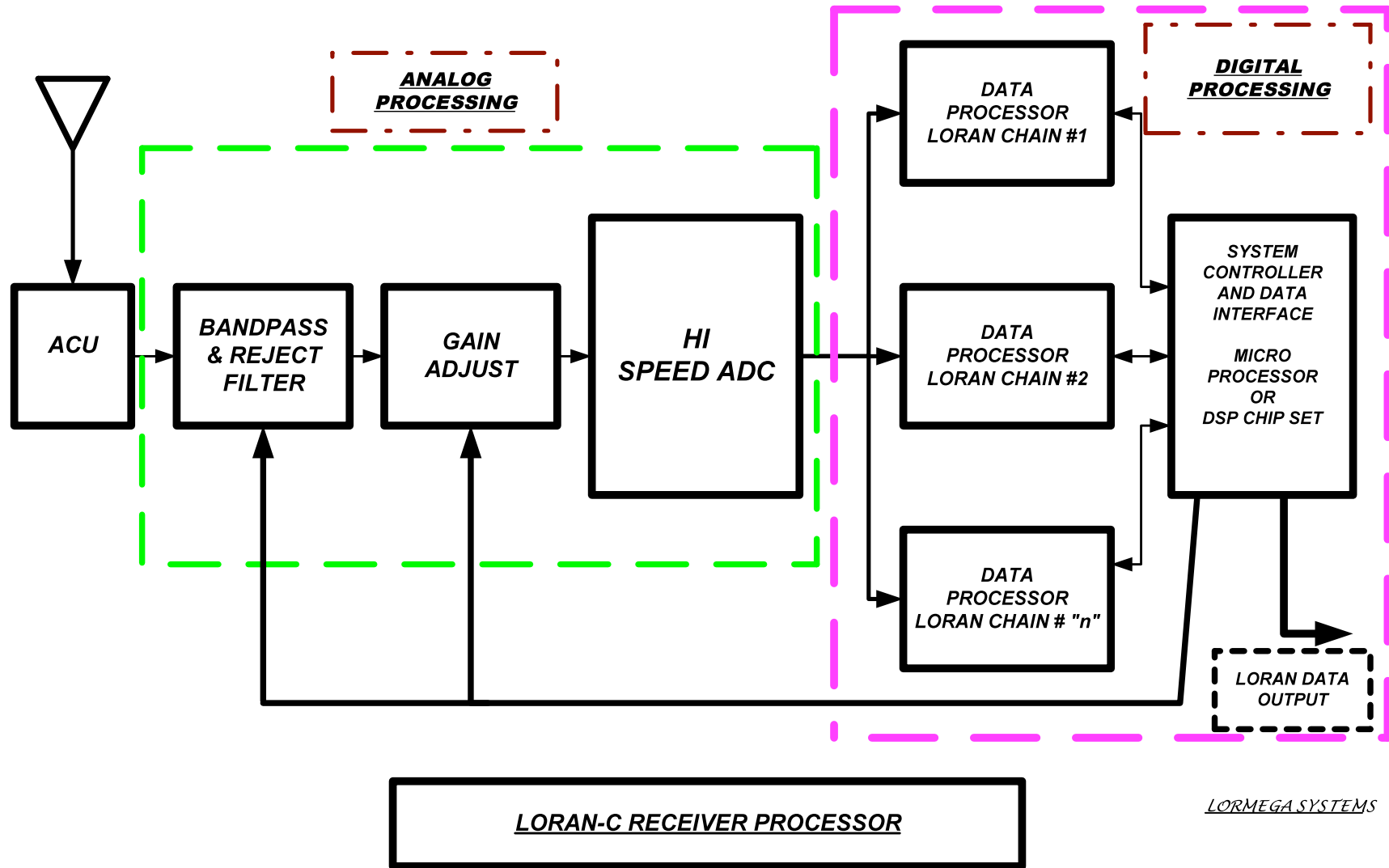## COMPACT, SENSITIVE ANTENNA DESIGN COMPATIBLE WITH 911 ENVIRONMENT

o   E-911 CALLER MAY BE IN ONE OF MANY POSSIBLE ENVIRONMENTS

o   ANTENNA SHOULD DEPLOY UPON INITIATION OF 911 CALL

o   DESIGN SHALL FOLD OR TELESCOPE INTO CELL PHONE AT CONCLUSION OF CALL

o   MUST PROVIDE FOR RECEPTION INSIDE BUILDINGS, INSIDE VEHICLES, UNDER FOLIAGE, etc. COVERING SCENARIOS NOT POSSIBLE WITH GPS. E-911 CALLS ARE NOT LIMITED TO UNOBSTRUCTED OUTDOOR CONDITIONS LIKE GPS.

o   THIS IS PERHAPS MOST SIGNIFICANT LORAN ANTENNA DESIGN CHALLENGE TO DATE

RECEIVER CONFIGURATION

o **PROTOTYPE WAS DEMONSTRATED IN 2001 AT MEGAPULSE & USCG STATION WILDWOOD, NJ**

o **UNCERTAINTY OF LORAN FUTURE AND MARKET SKEPTICISM PUT ALL EFFORTS ON HOLD**

o **FUNDING NEEDED TO DEVELOP CUSTOM CIRCUITS TO FIT IN CELL PHONE**

o **THE UNCERTAINTY IS BLESSING IN DISGUISE DUE TO RAPID PACE OF TECHNOLOGY THAT IS AVAILABLE TODAY**

o **DEVELOPED SW IS DIRECTLY APPLICABLE TO NEW DESIGN CONFIGURATION**

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ANALOG PROCESSING

DIGITAL PROCESSING

ACU

BANDPASS & REJECT FILTER

GAIN ADJUST

HI SPEED ADC

DATA PROCESSOR LORAN CHAIN #1

DATA PROCESSOR LORAN CHAIN #2

DATA PROCESSOR LORAN CHAIN # "n"

SYSTEM CONTROLLER AND DATA INTERFACE

MICRO PROCESSOR OR DSP CHIP SET

LORAN DATA OUTPUT

LORAN-C RECEIVER PROCESSOR

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RESULTS OF APPLYING CURRENT TECHNOLOGY

o HIGH PERFORMANCE (30 SEC, ACCURATE POSITION FIX RELATIVE TO PSAP)

o FLEXIBLE DESIGN

o LOW COST THROUGH USE OF READILY AVAILABLE ADC & DSP DEVICES

o COMPATIBLE WITH ANY MICROPROCESSOR ORIENTED PLATFORM, (HANDHELD, ETC)

BENEFITS

o MEETS CRITERIA FOR E-911 POSITION LOCATION REQUIREMENTS MANDATED BY US FCC

o DESIGN IS ADAPTABLE TO LORAN BASED DATA COMMUNICATION SYSTEMS

o TRACK MULTI-CHAIN DATA WITH ADDITION OF ONE DSP DEVICE + SW, PER ADDED CHAIN. ADDED DEVICES MAY BE INCLUDED IN COMMON ARRAY.

o WITH ANTENNA DEPLOYED, POSITION FIXES ARE READILY AVAILABLE FOR FULL TIME USE IF DESIRED