

IC System Architectures

IC Design

IC Consultancy

IC Contract Research

IC Design Training

IP Development

IP

CATENA

**partners in
electronic
design
& IP**





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Dear Partner,

Catena is an international group of innovative companies, experts in design of Integrated Circuits and independent IP.

Catena has since its establishment in 1986 developed as a center of excellence in Radio Frequency Communication, Analog, Mixed Signal and Digital Signal Processing. Evidence of our success is the continuous growth of the group, our expanding international customer base as well as our long standing strategic partnership with major semiconductor manufacturers.

Our group is located in high tech areas in the Netherlands, Sweden and Austria, with headquarters in Delft, the Netherlands. Catena is profitable, steadily growing and an exciting place for creative and ambitious engineers to work in. We are well positioned to be your partner in electronic design and IP.

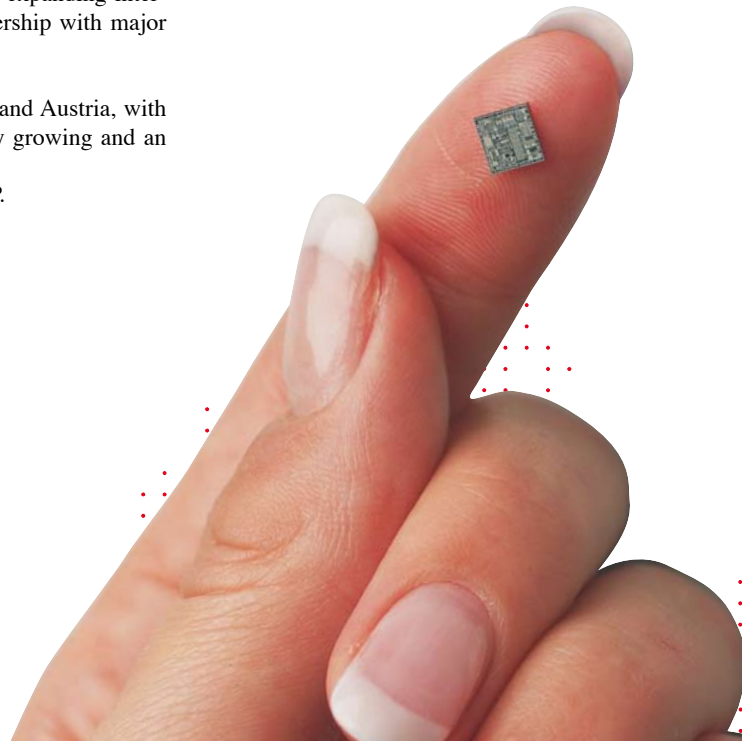
Sincerely yours,

A handwritten signature in black ink, appearing to be 'Rien Geurtsen'. The signature is stylized and written in a cursive-like font.

Rien Geurtsen
President Catena Group



partners in electronic design & IP



Capabilities and References

EXPERTISE

Cellular Communication:

- GSM
- Edge
- GPRS
- 3G/UMTS

Wireless Data Communication:

- WLAN
- Bluetooth
- ISM band
- WiMAX

Satellite:

- DVB Receivers
- Digital Radio Receivers

Medical Electronics

Instrumentation

Consumer Radio

- AM/FM Radio
- Digital Radio

MAJOR FOUNDRIES

- NXP Semiconductors
- AMS
- GLOBALFOUNDRIES
- TSMC
- UMC
- STMicroelectronics

MAJOR CUSTOMERS

- ST-Ericsson
- Intel
- Infineon
- NXP Semiconductors
- National Semiconductor
- Zarlink
- Texas Instruments
- AMS
- STMicroelectronics

Our Services

IC Architecture and Consultancy, Circuit Design and Contract Research

At the start of a typical project we assist customers in translating their system requirements into a suitable IC architecture with agreed target specifications. After that we take care of the design and layout of the integrated circuit. For circuit realization we have access to a wide set of processes based on Silicon, Silicon-Germanium and Gallium-Arsenide and our expertise covers Bipolar, CMOS and BiCMOS technologies. The semiconductor manufacturer receives verified GDSII computer data as well as assembly and test information. Prototype samples are evaluated in



our own fully equipped measurement labs. Upon positive evaluation results we offer the manufacturer support to facilitate release to production.

In summary, Catena is well positioned to offer added value to its customers by generating creative solutions for new and existing design challenges.

Rather than providing extra design capacity, Catena's focus is to be a true R&D partner allowing the customer to fully benefit from its high level of expertise.

Today the Catena IC design group has evolved in a leading independent

IC design force employing more than 120 engineers. Our multinational design team has been carefully selected to guarantee the highest level of skills in the design of analog, mixed signal and DSP ICs with a strong focus on RF well into the GHz range. Our DSP design involves hardware and embedded software.

All of the above activities can be split for our customers in separate independent consultancy, prestudies and studies, system architecture development, IC design and customer support.





Secure Customer Investment

Our customers bring to the Catena Design Centers their strategic R&D for system and circuit design. Any delay will cause problems for their planned market introduction of their IC. Therefore we have invested in powerful file servers in each Design Center as well as in high end back-up solutions to save our engineers work and our customers investment. Total storage capacity is 115 Tera Byte.

Flexibility for the Customer

Due to our secured fibre optic connections between our Design Centers in Kista, Delft and Son en Breugel our customers benefit from the best specialists working together in one dedicated intercompany project team. Extra second security, in case the fibre optic connection would break down, is obtained by having an extra backbone network and a third security option is an IP-VPN gateway for more than 100 engineers working from home with our central computers. Furthermore to protect work for emergency break down we have installed battery back-ups and an own independent power supply unit.

The project data are shared and only accessible on a “need to know basis” by project team members. Data are extra stored per one time per hour “snapshots” in decentralized file servers and furthermore protected by on disk storage outside the competence center involved.

CATENA

Our IC Design, Training and Competence Centers are:

Catena Microelectronics by
Delftechpark
Delft, the Netherlands

Catena Wireless Electronics AB
Wireless Valley
Kista, Sweden

Catena Radio Design by
Science Park Eindhoven
Son en Breugel, the Netherlands

Catena DSP GmbH
Vienna, Austria

IC Design Training

Both for our own purposes and for the benefit of our customers, we have developed training workshops on advanced electronic design. These courses are intended for professional designers who wish to improve their competence level, thereby reducing development time and guaranteeing quality by design. A highly systematic design approach is used. It supports the correct interpretation of performance requirements as well as translation into target specifications. It subdivides electronic systems into basic functions, the design aspects of which are all covered in detail. Wherever possible, a synthesis instead of an analysis approach is emphasized.



Recently we have also developed a basic RF introduction course intended for beginners, managers and marketing engineers in this field in order to familiarize them with the possibilities of wireless techniques. This course completes our workshop program which is as follows:

- RF Introduction
- Design Technique of Low Noise Wide-Band Amplifiers
- RF Transceiver Design
- PLL Design
- Advanced Digital Modulation Techniques
- Digital Signal Processing

These workshops can be tailored to specific customer requirements. They can be held in our training facilities in Kista, Sweden and in Delft and Son en Breugel in the Netherlands or upon request at your site.

Workshops

Introduction to RF Design

Brief historical overview
Transmission of information
Standards
Radio system example
RF IC production
RF building blocks
Radio architectures
RF measurements
Integration aspects

Design Technique of Low-Noise Wide-Band Amplifiers

Definitions, models, specifications
Amplification mechanisms & amplifying devices
CE & CS amplifier stages
Noise, speed & power limitations
Balancing & negative feedback
Single- & multi-stage amplifiers
HF compensation
Biasing
Design exercises

RF Transceiver Design

Antenna filter & LNA
Up/down mixer
Local oscillator
Limiter chain
RSSI
Detector
Design exercises

PLL Design

Architecture & loop transfer characteristics
Frequency dividers
Phase detector
VCO
Jitter/noise aspects
Stability & loop filter
Transient response
Reference spurious
PLL optimization
Design exercises

Digital Modulation

Basics
Transmission principles
Analog modulation
Binary modulation
M-ary modulation & pulse shaping
Practical considerations
Carrier & Symbol Synchronization
Terrestrial broadcasting
Wireless Personal Area Networks
Exercises

Digital Signal Processing



IP Development and Availability

IP and System Solutions

Together with selected partners Catena has developed and continues to develop silicon proven differentiator IP and system solutions to enable its customers to be successful in dynamic and competitive markets. The silicon proven IP can be relatively quickly adapted to customers' specifications, thereby reducing time-to-market and costs.

IP Roadmap

Catena's IP roadmap main focus is on high performance RF, mixed-signal and ultra low power DSP solutions in the areas of wireless and consumer applications. IP roadmap implementation is aligned on the one side with market requirements and on the other side with deep sub-micron process roadmaps of major foundries.

Main Application Areas

Wireless: WiFi, WiMAX, ZigBee, ISM
Consumer: AM/FM Radio, Digital Radio, TV, GPS
MEMS Sensors: Gyroscope, Accelerometer

Catena has close co-operation and executes research activities at several European Universities and is an active member of industry standardization forums.

IP Available

Please connect to:
www.chipestimate.com and or contact us directly info@catena.nl

The word "CATENA" is written in a large, grey, serif font. The letters are surrounded by a decorative pattern of red dots that form a circular shape around the text.

Catena supports GLOBALFOUNDRIES as its preferred supplier of MPW services for ongoing IP development.

Member or partner of:



www.chipestimate.com



www.bluetooth.com



www.tsmc.com



www.drm.org



www.rds.org.uk



www.globalfoundries.com

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Training, design & test



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Training, design & test



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