RFIC CMOS WIRELESS TRANSCEIVER

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MSRIT & RFIC TECHNOLOGIES

Bangalore

July 4th 2015

AGENDA…

- WIRELESS TECHNOLOGIES
- TRANSCEIVER PRODUCTS AND COMPANIES
- TRANSMITTER
- RECEIVER
- SYNTHESIZER
- CMOS RF PROCESS
- CHALLENGES IN CMOS PROCESS
- FOUNDRIES

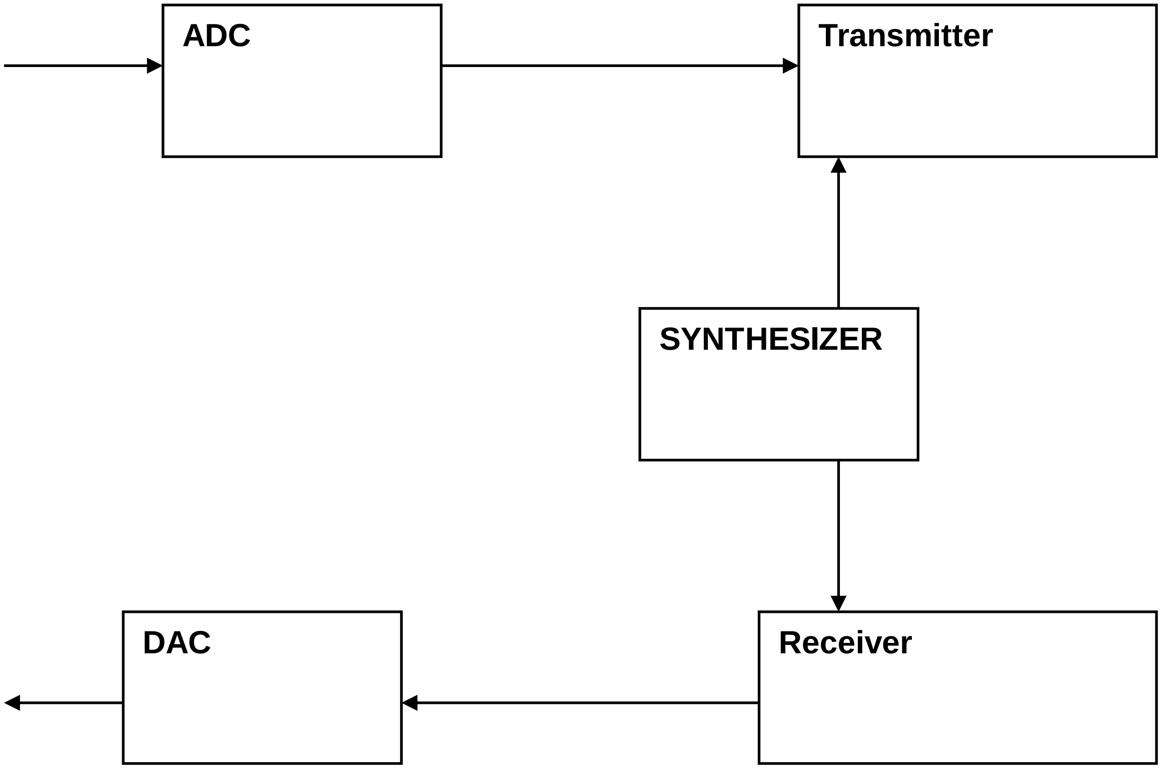
AGENDA

- RF FRONT END BLOCKS
- LNA, PA, SWITCH
- CADENCE DESIGN FLOW
- DESIGN EXAMPLE OF RF FRONT END CHIP
- CIRCUIT, LAYOUT,VERIFICATION,TAPE OUT, SAMPLE TESTING
- DEMO OF ONE CHIP IN CADENCE TOOL
- ABOUT OUR COMPANY RFIC TECHNOLOGIES
- CONCLUSIONS

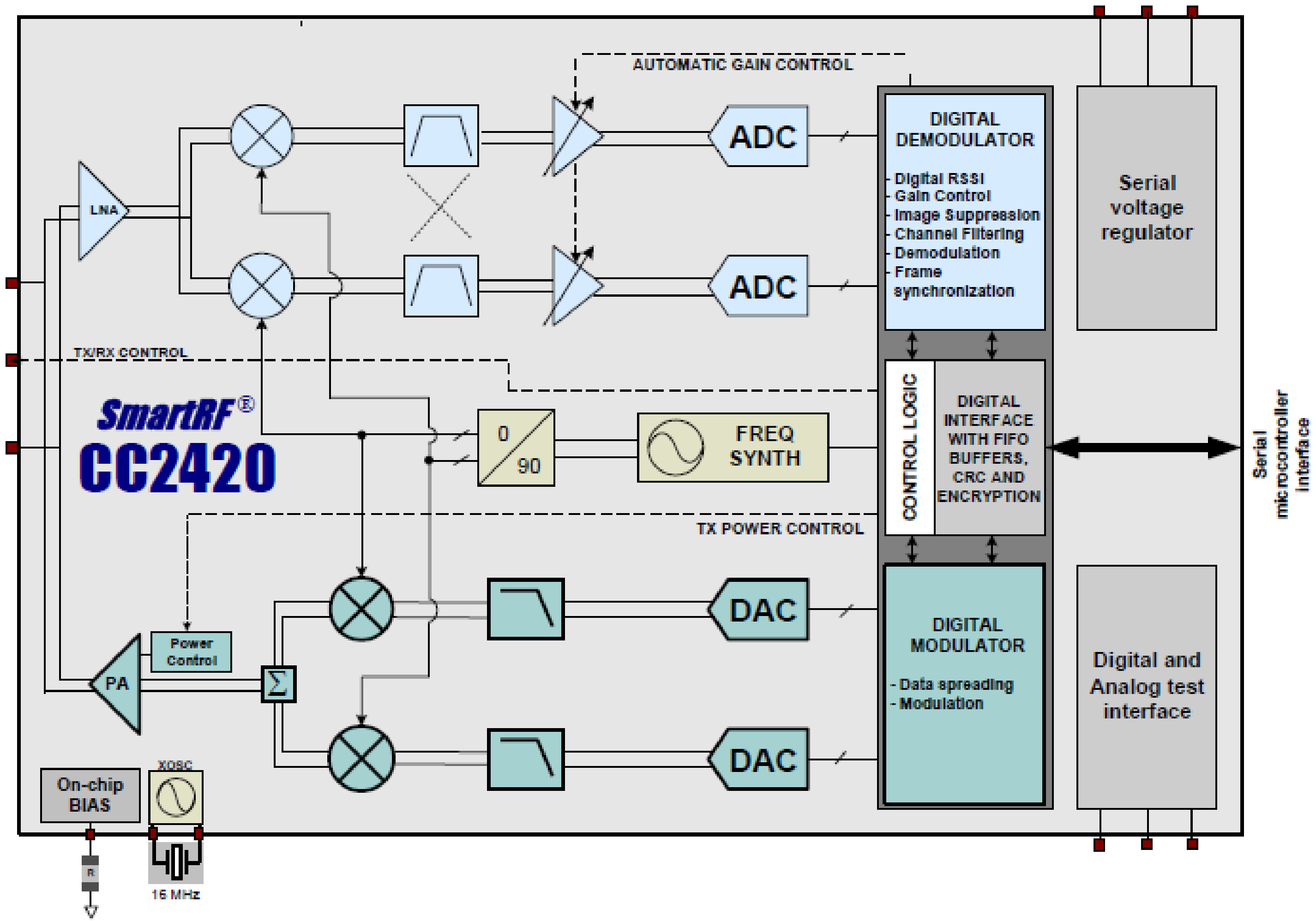
WIRELESS TECHNOLOGIES

- WLAN : WI-FI, HOTSPOT, ACCESS POINT
- UWB : SHORT RANGE HIGH SPEED
- MOBILE PHONE
- ZIGBEE : HOME AND INDUSTRY AUTOMATION
- BLUETOOTH: HOME AUTOMATION, WIRELESS MOUSE, WIRELESS KEYBOARD
- RFID : CONTACT LESS CARD, ASSET TRACKING, ATTENDANCE SYSTEM
- DEFENCE AND SATELLITE

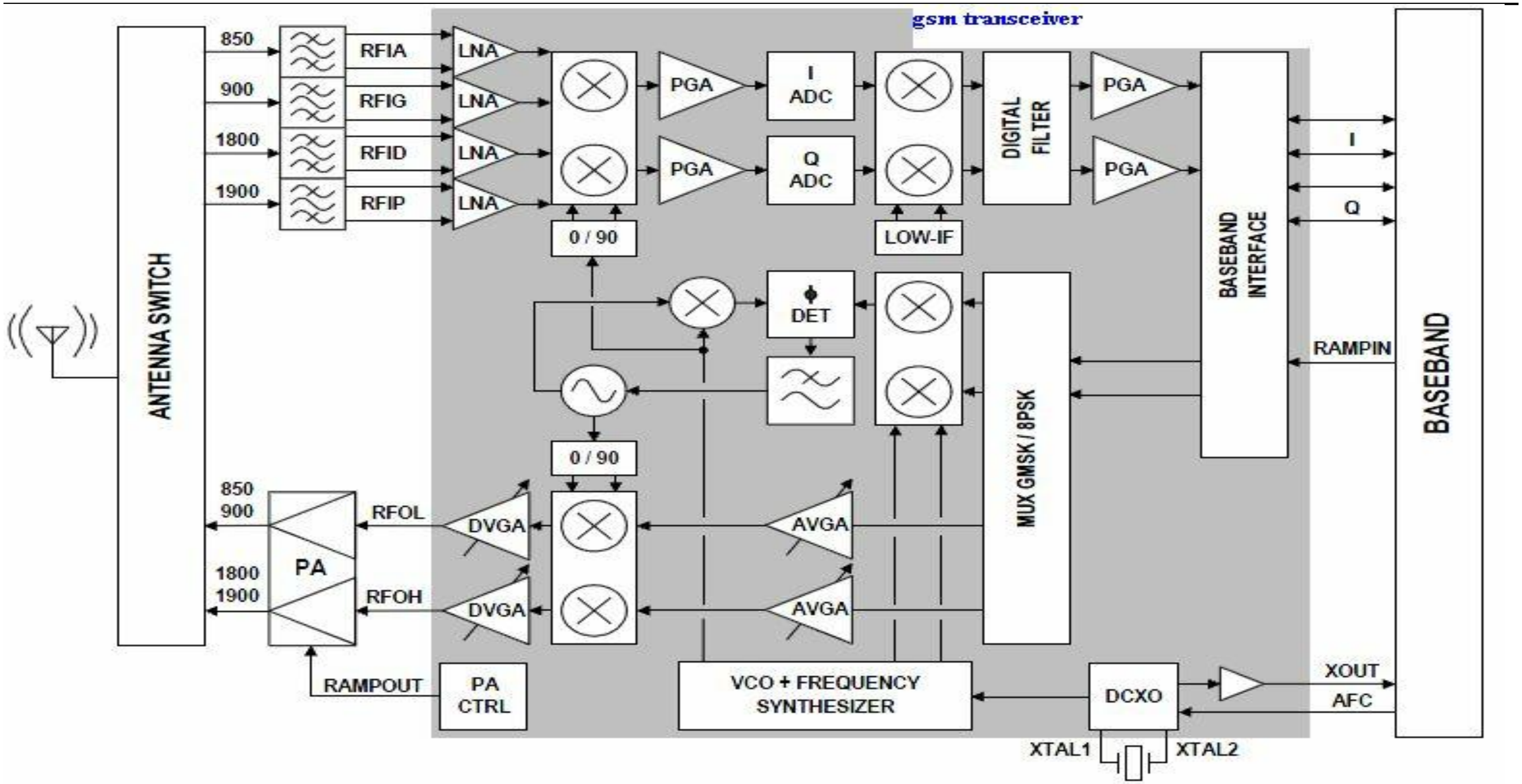
BASIC TRANCEIVER



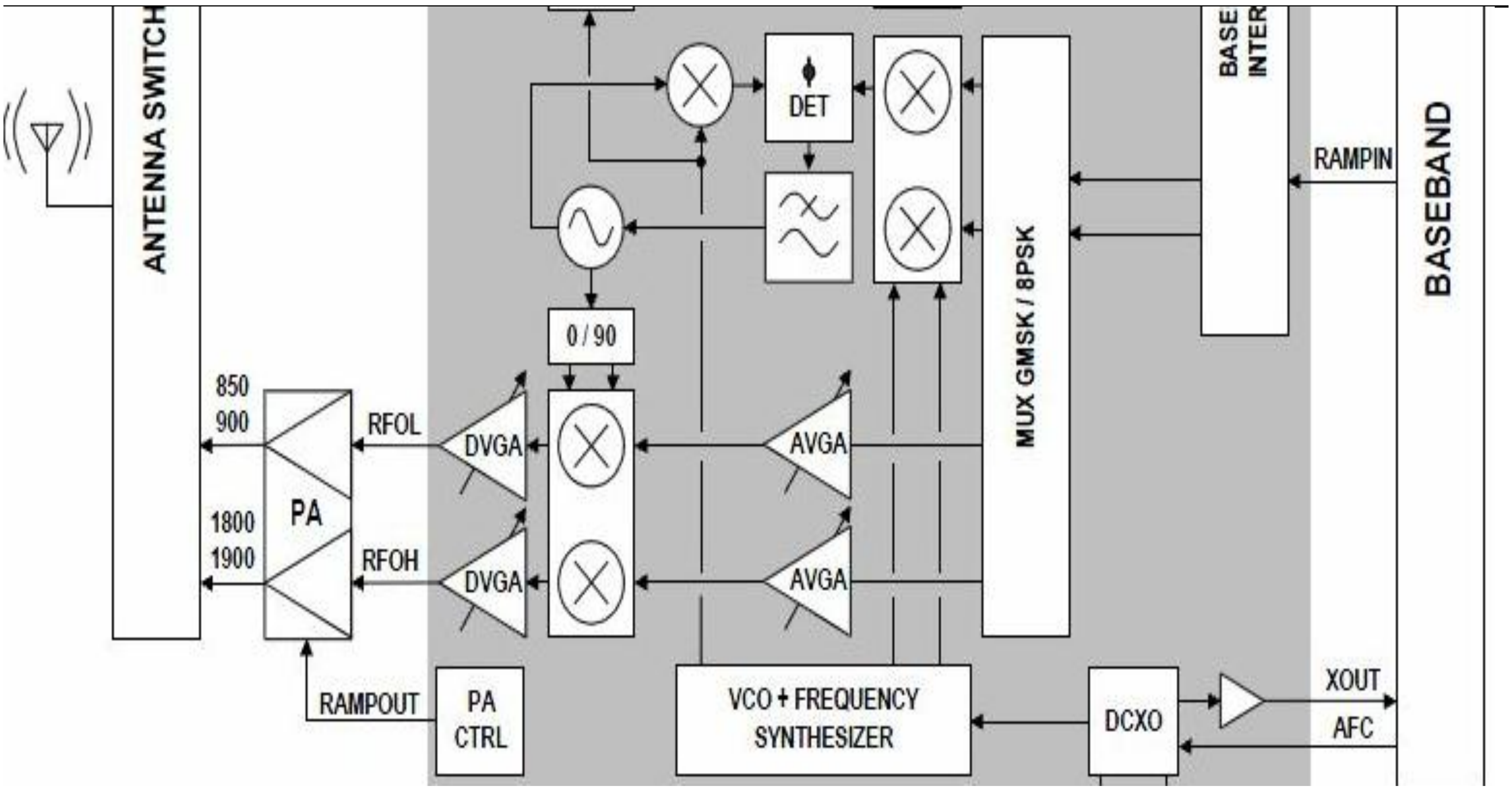
CC2420-ZIGBEE TRANCEIVER



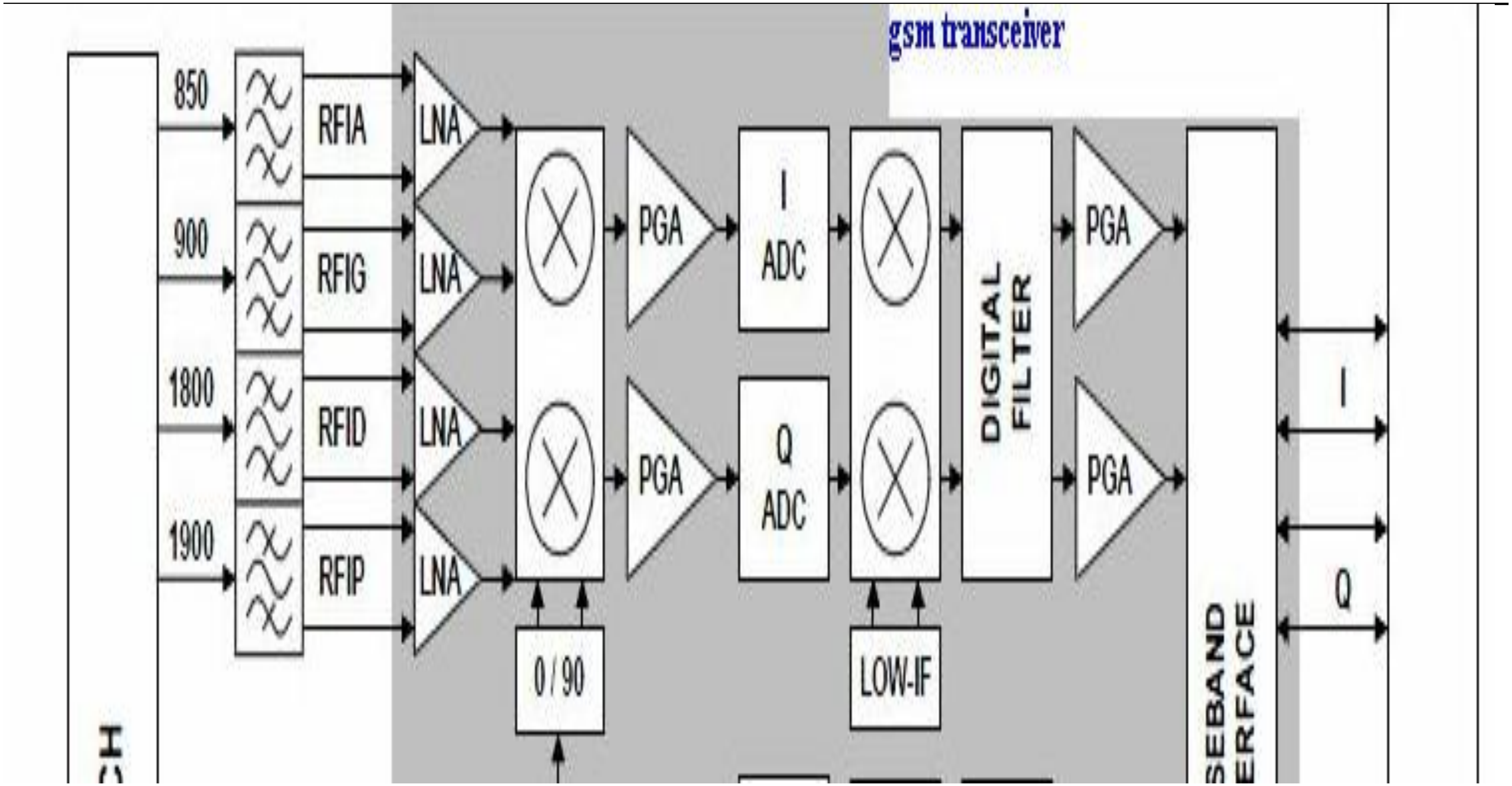
MOBILE PHONE TRANCEIVER



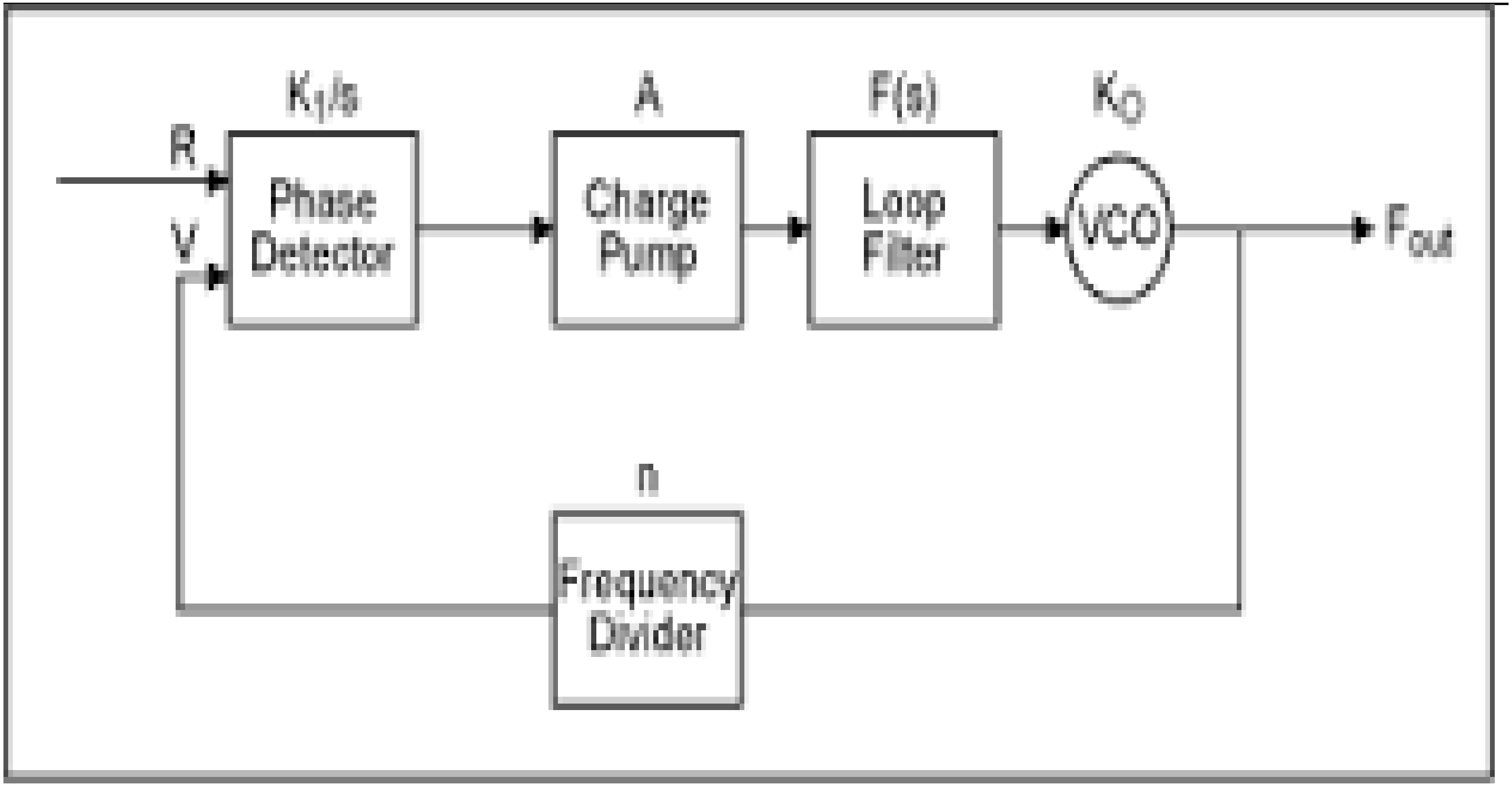
TRANSMITTER



RECEIVER


gsm transceiver
850
900
1800
1900
RFIA
RFIG
RFID
RFIP
LNA
LNA
LNA
LNA
PGA
PGA
I
ADC
Q
ADC
DIGITAL
FILTER
PGA
PGA
0 / 90
LOW-IF
I
Q
SEBAND
ERFACE
CH

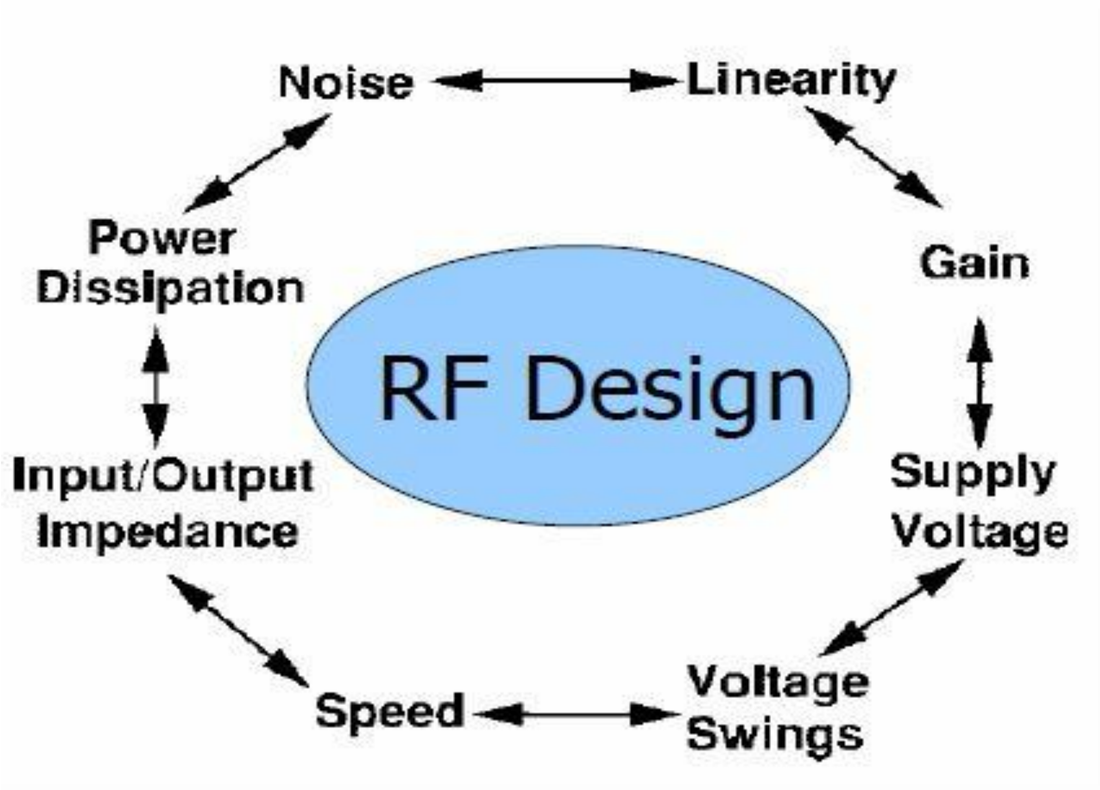
FREQUENCY SYNTHESIZER



PROCESS COMPARISON

PARAMETER	CMOS	BIPOLAR	GAAS
COST	VERY LOW	MEDIUM	HIGH
PACKING DENSITY	HIGH	MEDIUM	LOW
POWER DISSIPATION	LOW	MEDIUM	HIGH
POWER HANDLING	LOW	MEDIUM	MEDIUM

CHALLENGES CMOS RFIC



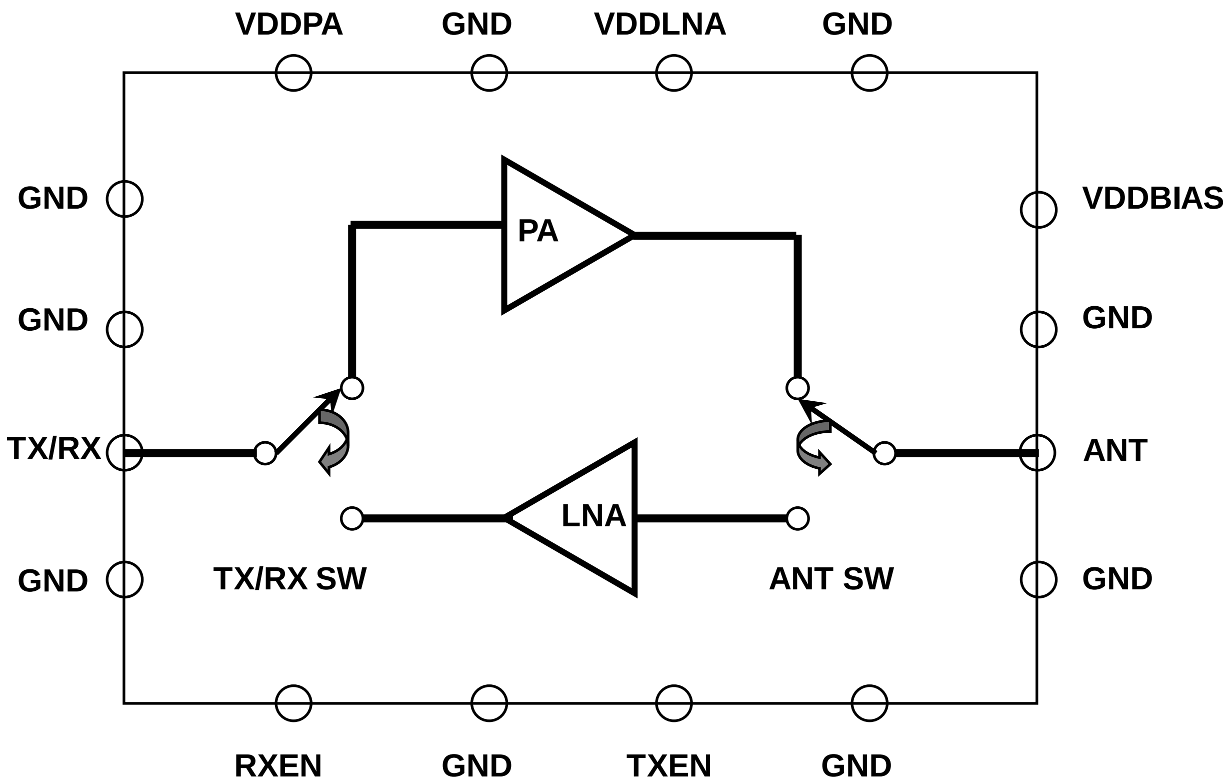
WHY CMOSRF PROCESS

- LOW COST
- GOOD FOR BELOW 10GHZ
- PASSIVE COMPONENTS ON DIE
  - INDUCTOR, CAPACITOR, VARACTOR
- HIGH INTEGRATION
  - INTIGRATE SENSOR-DIGITAL-ANALOG-RF IN ONE CHIP
  - ON CHIP CALIBRATION

FOUNDRIES

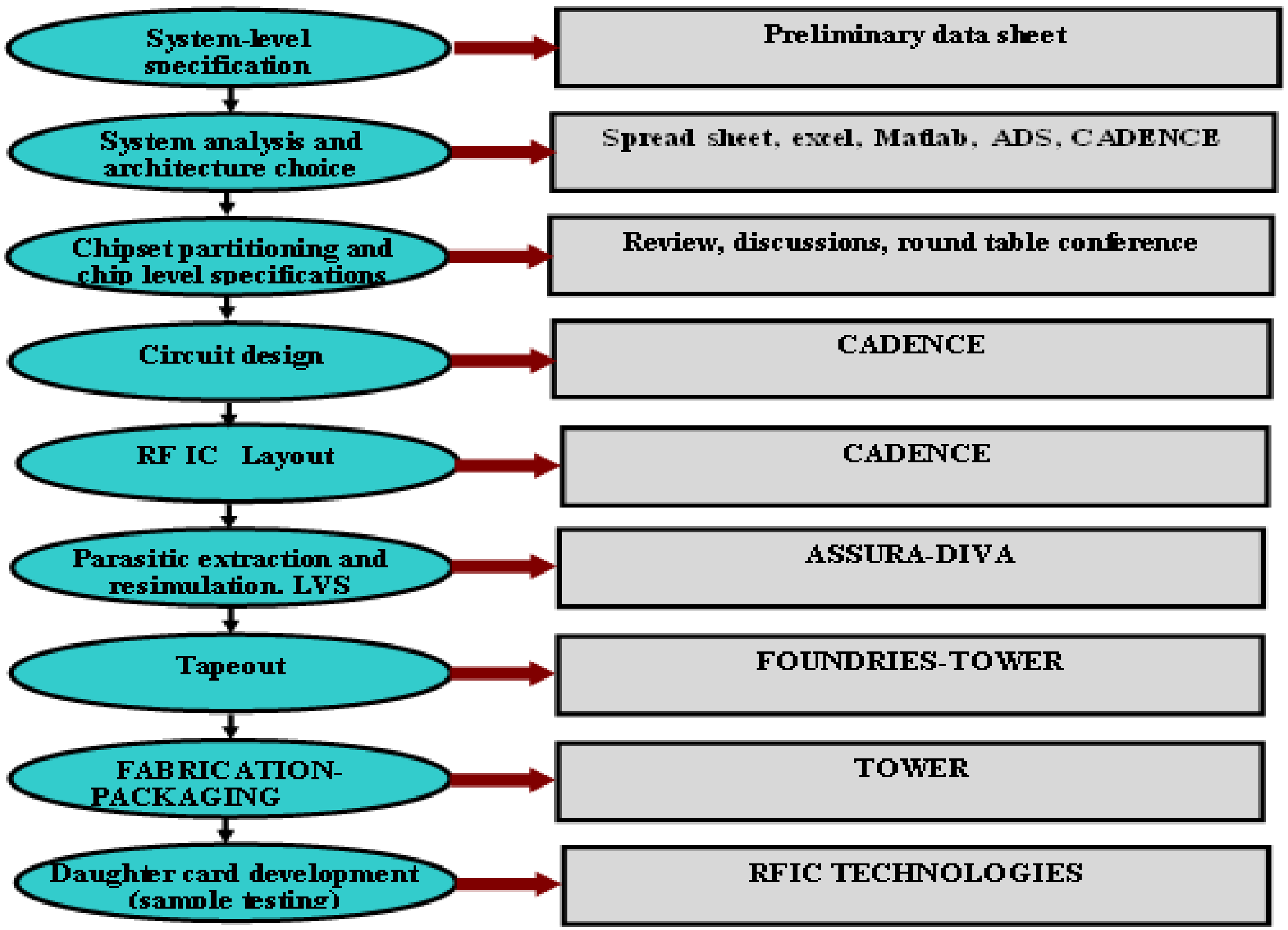
- TSMC
- UMC
- TOWER
- X-FAB
- GLOBAL FOUNDRIES
- INTEL
- IBM
- FUJITSU

RF FRONT END CHIP

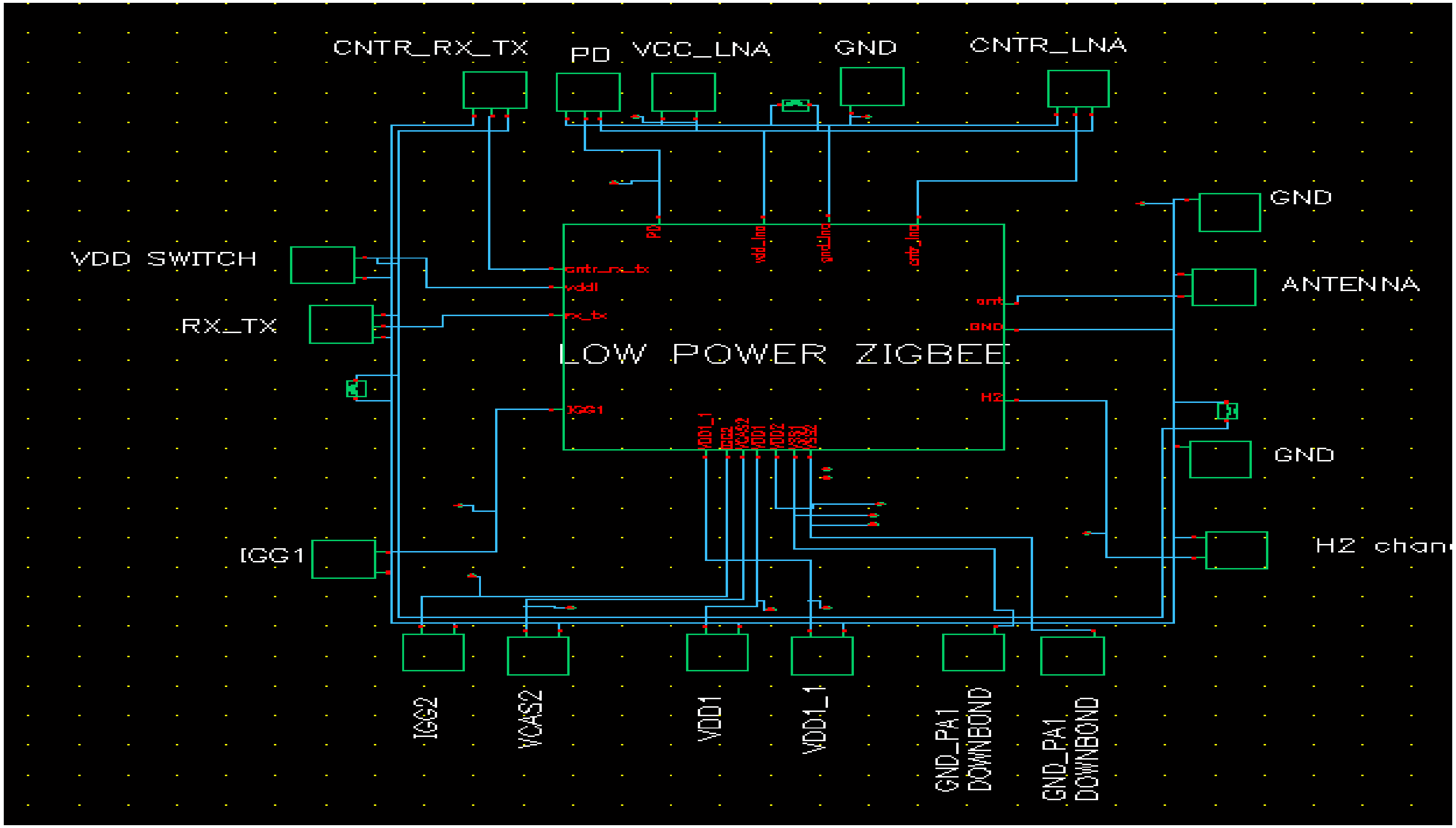


SPECIFICATION DATA SHEET-OPEN

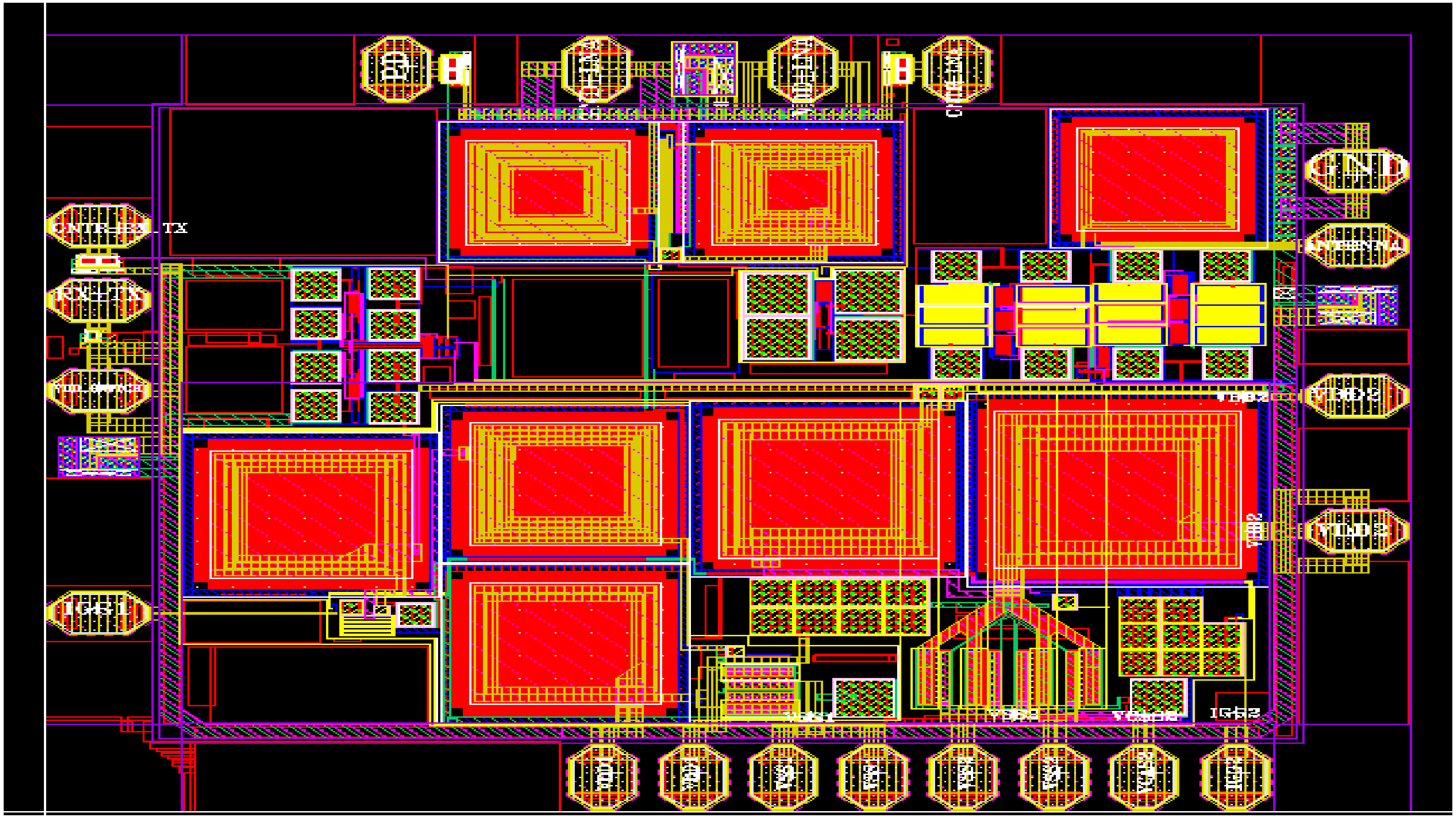
CADENCE DESIGN FLOW



RFF-1001: RF FRONT END ZIGBEE-PA, LNA AND SWITCH



RFF-1001 : THE FULL CHIP LAYOUT



LNA

- FREQUENCY : 2.4 TO 2.5GHZ
- BLUETOOTH, ZIGBEE, WLAN APPLICATIONS
- NOISE FIGURE : 1.5dB
- GAIN : 15 dB
  - WITH BYPASS MODE
- DC : 1.8V Vdd 6mA single ended
- SHUTDOWN POWER : 1uA

SWITCH

- FREQUENCY : DC TO 5 GHZ
- BLUETOOTH, ZIGBEE, WLAN APPLICATIONS
- INSERTION LOSS : 0.6 dB
- ISOLATION : 40 dB
- POWER HANDLING : 30 dBM
- 1DB COMPRESSION POINT:30 dBM
- DC : 3.3V VDD
- SHUTDOWN POWER : 1UA

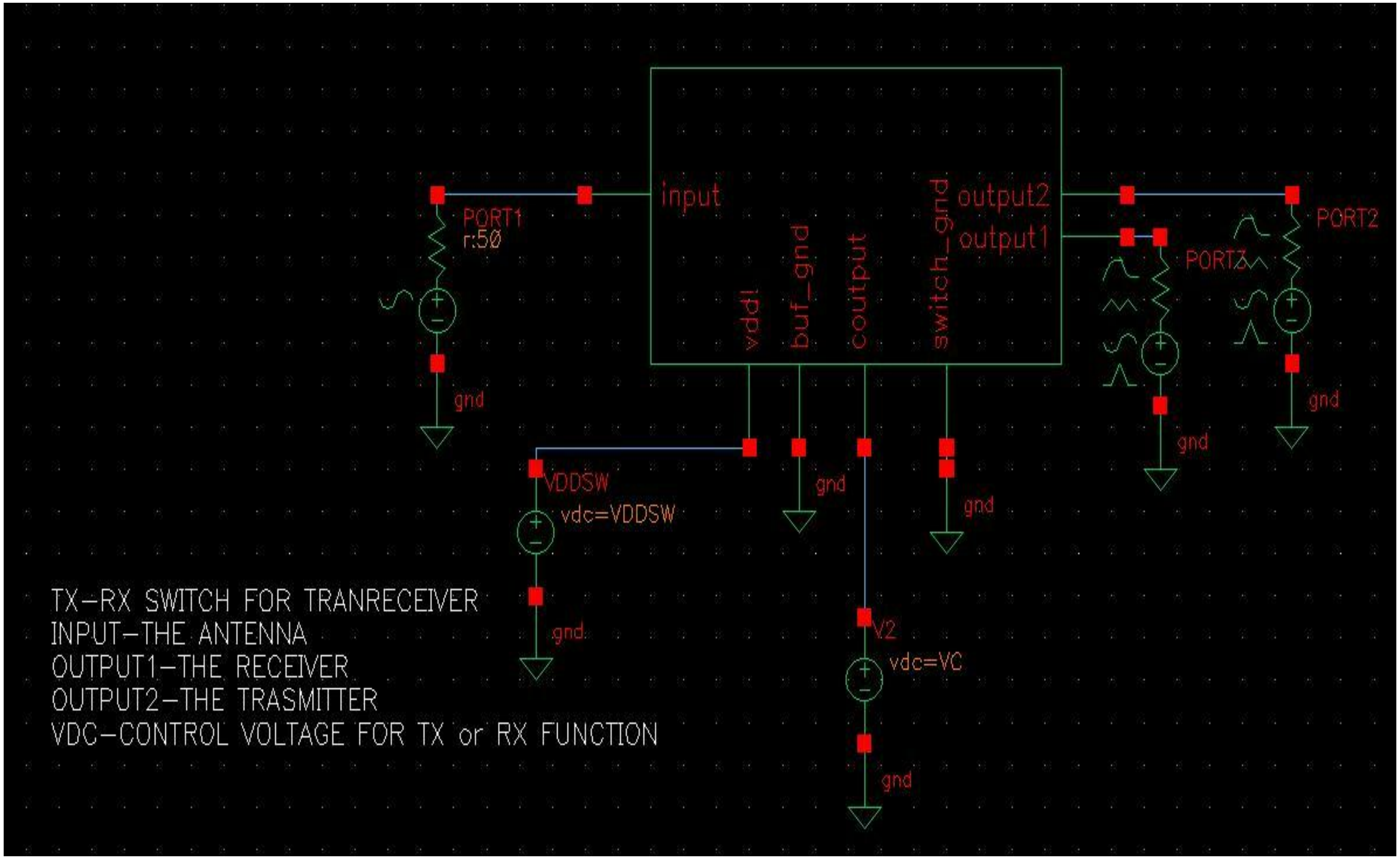
POWER AMPLIFIER

- FREQUENCY : 2.4 TO 2.5 GHZ
- BLUETOOTH, ZIGBEE APPLICATIONS
- GAIN : 25dB
- 1DB COMPRESSION POINT: 20 dBM
- DC : 3.3V VDD
  - 130MA MAX GAIN
- SHUTDOWN POWER : 1UA

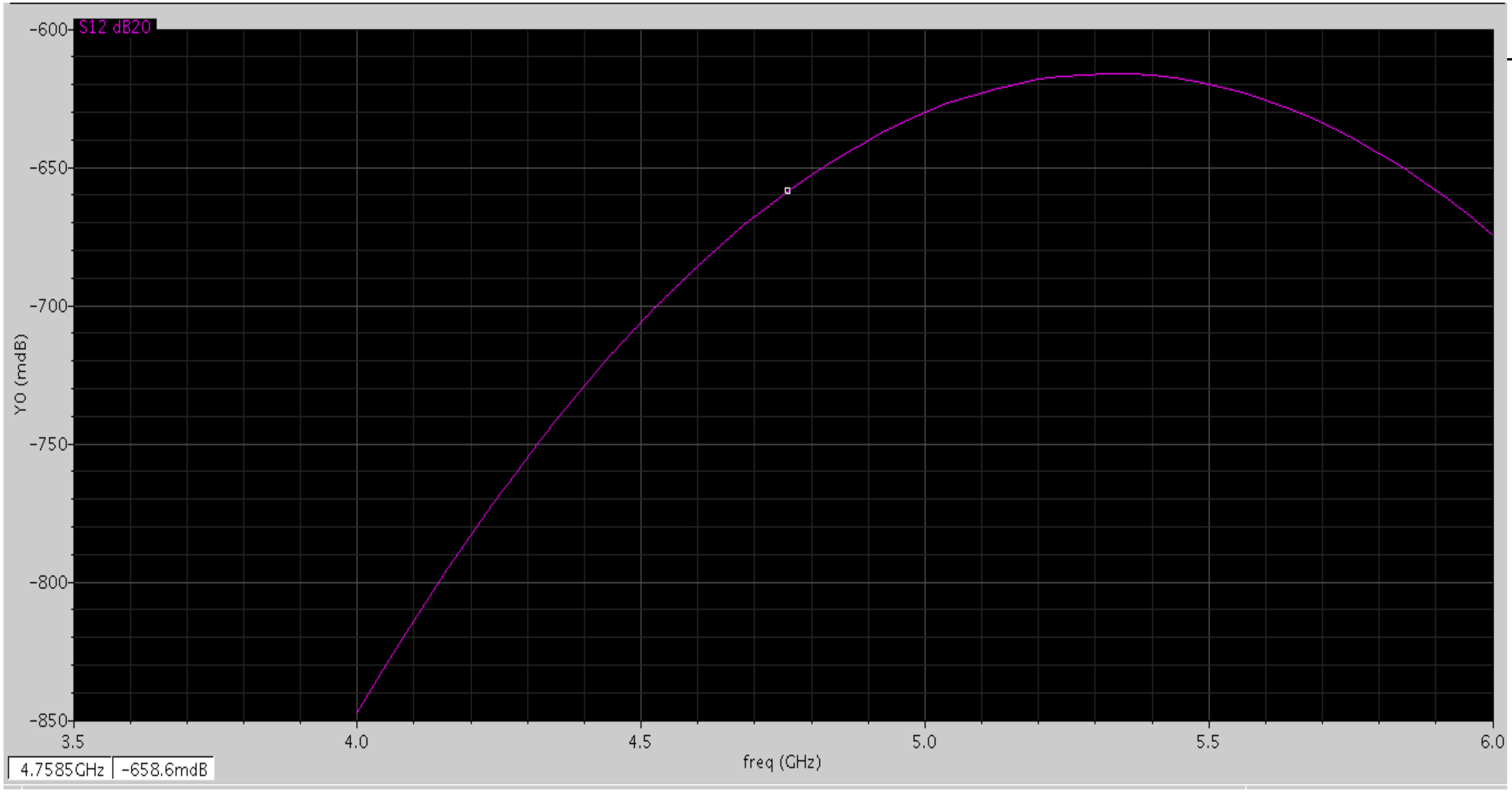
RFF-1001: TESTING

- PA
  - GAIN: 25dB
  - POUT : 20dBM @130mA
- LNA
  - GAIN : 15DB @6mA CURRENT
  - NOISE FIGURE : 1.5 dB
- SWITCH
  - INSERTION LOSS : 0.6dB
  - POWER HANDLING : 30dBM

SWITCH DESIGN



SWITCH SIMULATION



DESIGN EXAMPLE OF RF FRONT END CHIP

- DEMO WILL BE SHOWN TOWARDS END OF THIS PRSENTATION

CMOS RFIC COMPANIES-INDIA

- QUALCOMM
- BROADCOMM
- INTEL
- MAXIM
- ANALOG DEVICE
- TI
- AVAGO TECHNOLOGIES
- FREESCALE
- ATHERO
- WIPRO
- TCS
- STILL MORE…

STUDENTS SHOULD KNOW

- MICROWAVE THEORY
- SEMICONDUCTOR PHYSICS
- ANALOG CIRCUITS
- VLSI
- CAD TOOL
- VHDL, VERILOG
- MEASUREMENTS

RFIC TECHNOLOGIES

RFIC TECHNOLOGIES IS WORKING ON CUTTING EDGE TECHNOLOGIES FOR PRODUCING LOW COST HIGH PERFORMANCE

- WIRELESS SYSTEM
- RFIC
- ELECTRONICS
- EMBEDDED SYSTEM

RESEARCH OPPORTUNITY

- Helping you for achieving the goal faster and it is free of cost.
- Free cadence design tool to use for your research. You can login from your college and use the cadence.
- guidance from us and 1 hour per week for the discussion.
- Interested ? send your bio data to suchitav@rficdesign.com for the discussion.
  - http://www.rficdesign.com/research-opportunity.htm

OUR BUSINESS

- PRODUCT DEVELOPMENT
  - RFIC CHIP : RF FRONT END CHIP
  - RFIC IP
  - SCHOOL MANAGEMENT SYSTEM
    - SOFTWARE+HARDWARE
    - WWW.GARUDSMS.COM

- RFIC DESIGN SERVICE
  - SYSTEM LEVEL TO SAMPLE TESTING

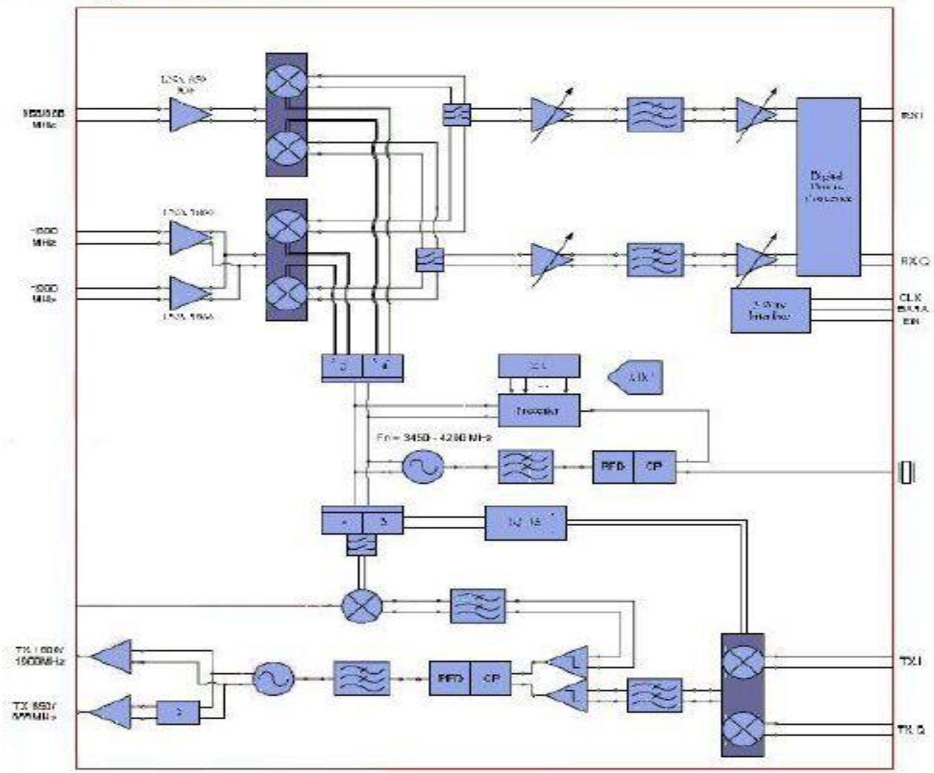
RFIC FRONT END CHIP

- RFF-1001:ZIGBEE FRONT END
  - ZIGBEE 2.4GHZ OPERATION
  - LNA SWITCH PA IN ONE CHIP
  - TOWER 180nm CMOS RF PROCESS
- RFS-1003 :SWITCH MATRIX
  - FREQUENCY 400 MHZ TO 4000 MHZ
  - LTE SMARTPHONE USE
  - INSERTION LOSS 0.7 dB OVER THE RANGE
- MORE RFICS-VCO, TX, RX BLOCKS

TRANSCEIVER-IP

- CMOS 90NM
- AVAILABLE COMPLETE TRANSMITTER-RECEIVER OR FEW BLOCKS
- HTTP://WWW.RFICDESIGN.COM/DOWNLOAD/TRANSMITER-RECEIVER.PDF

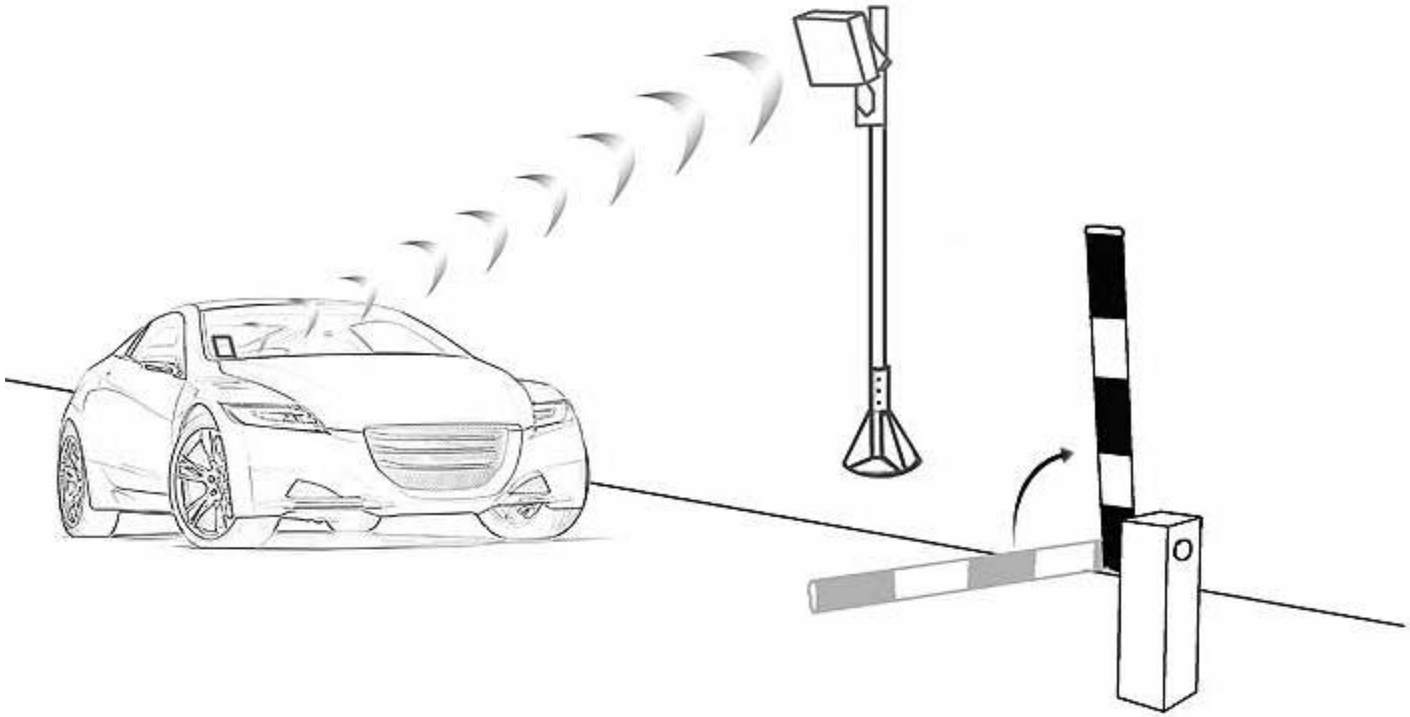
Full chip transreceiver



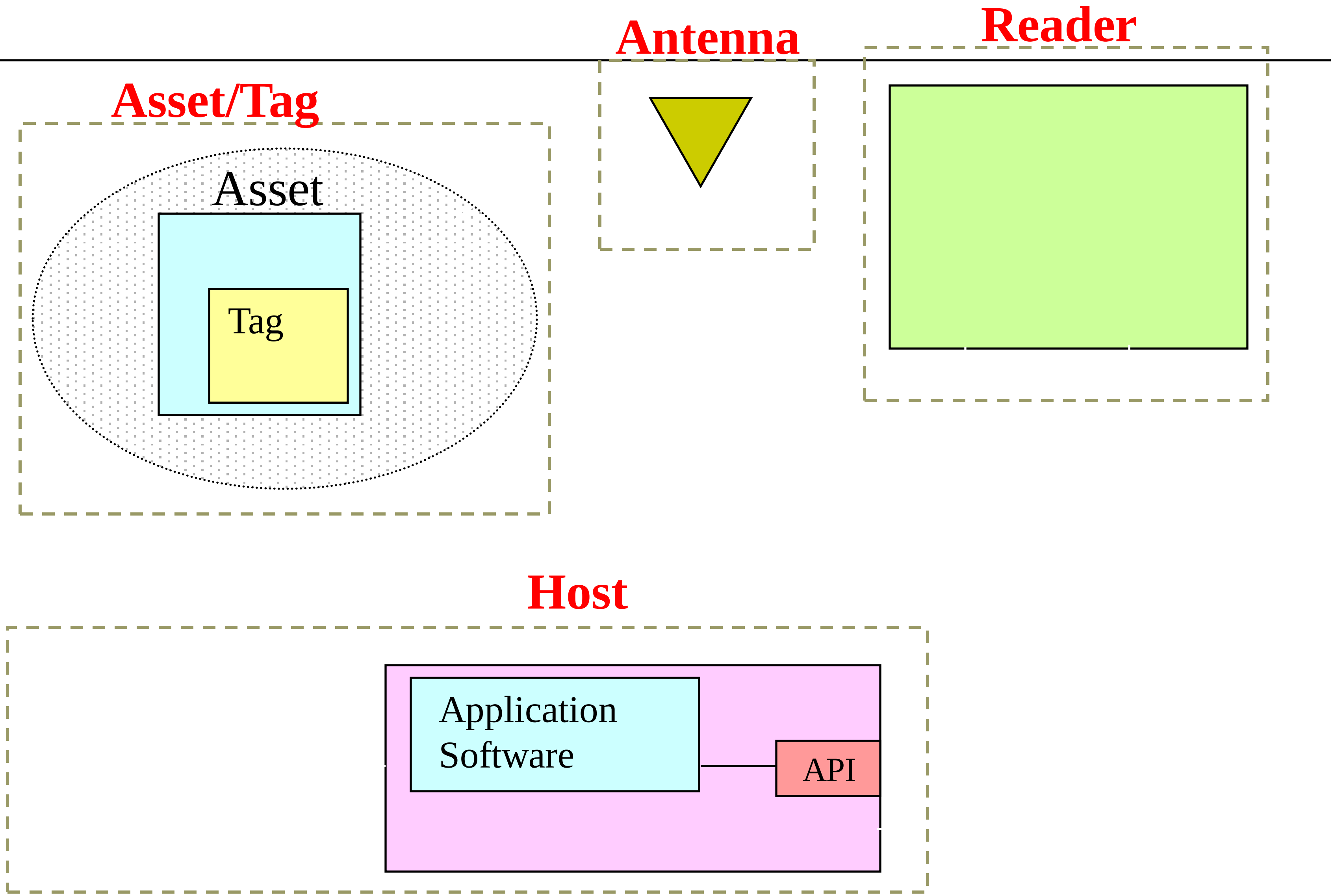
RFID
RADIO FREQUENCY IDENTIFICATION

LIBRARY MANAGEMENT

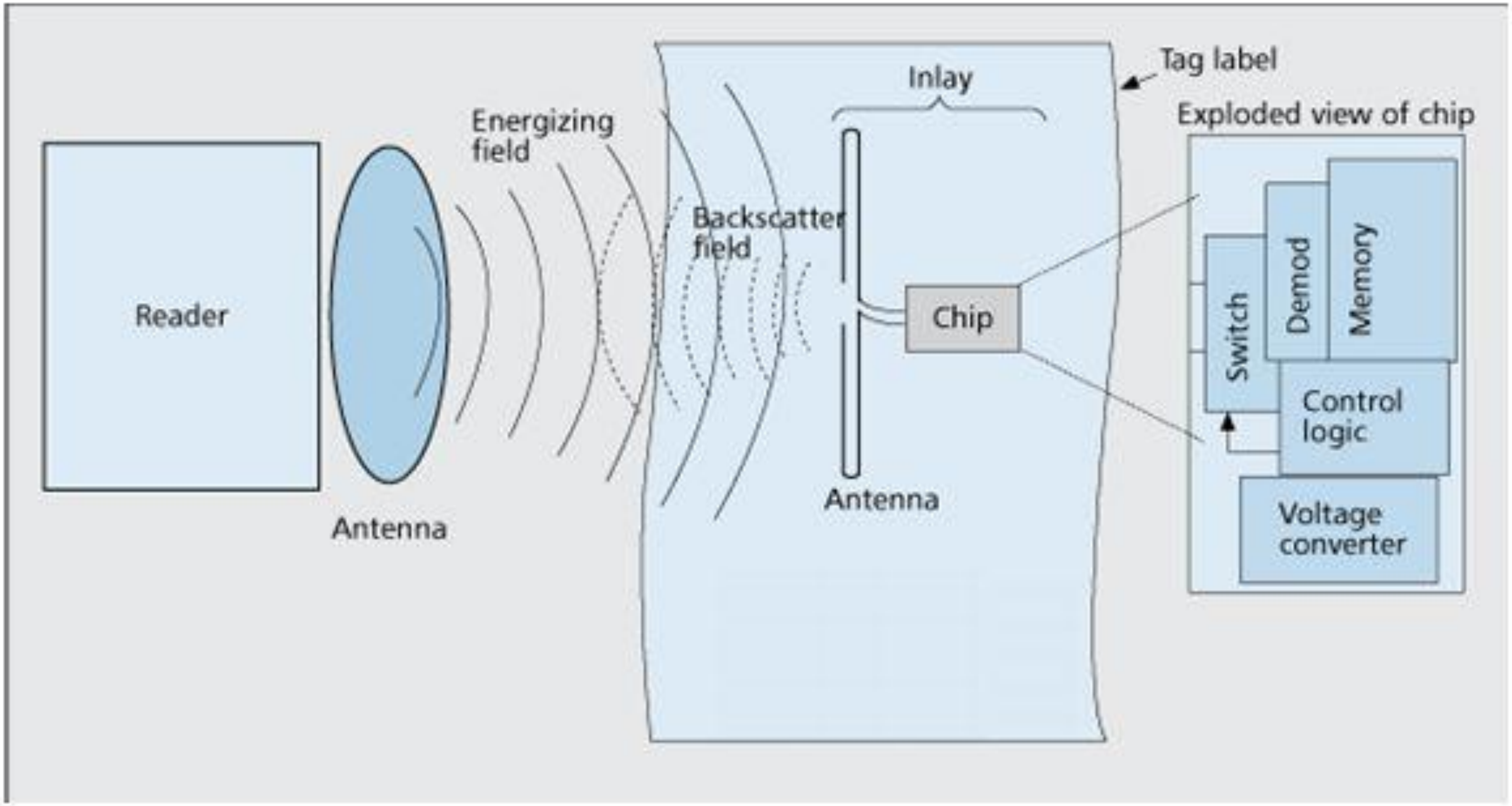
PARKING AND TOLL COLLECTION



RFID SYSTEM COMPONENTS



THE RFID CHIP



REFERENCE

- THE DESIGN OF CMOS RADIO-FREQUENCY INTEGRATED CIRCUITS BY THOMAS H. LEE
- RF MICROELECTRONICS BY BEHZAD RAZAVI
- DESIGN OF ANALOG CMOS INTEGRATED CIRCUITS BY BEHZAD RAZAVI
- CMOS RFIC DESIGN PRINCIPLES BY AUTHOR: ROBERT CAVERLY
- RADIO-FREQUENCY INTEGRATED-CIRCUIT ENGINEERING BY CAM NGUYEN
- SUBSTRATE NOISE COUPLING IN RFICS BY AHMED HELMY
- WWW.ENGPAPER.COM

CONCLUSIONS

- CMOS RFIC IS A LARGE AREA
- IT IS EVERYWHERE SURROUNDED
  - MOBILE PHONE, WI-FI, BLUETOOTH, RFID .

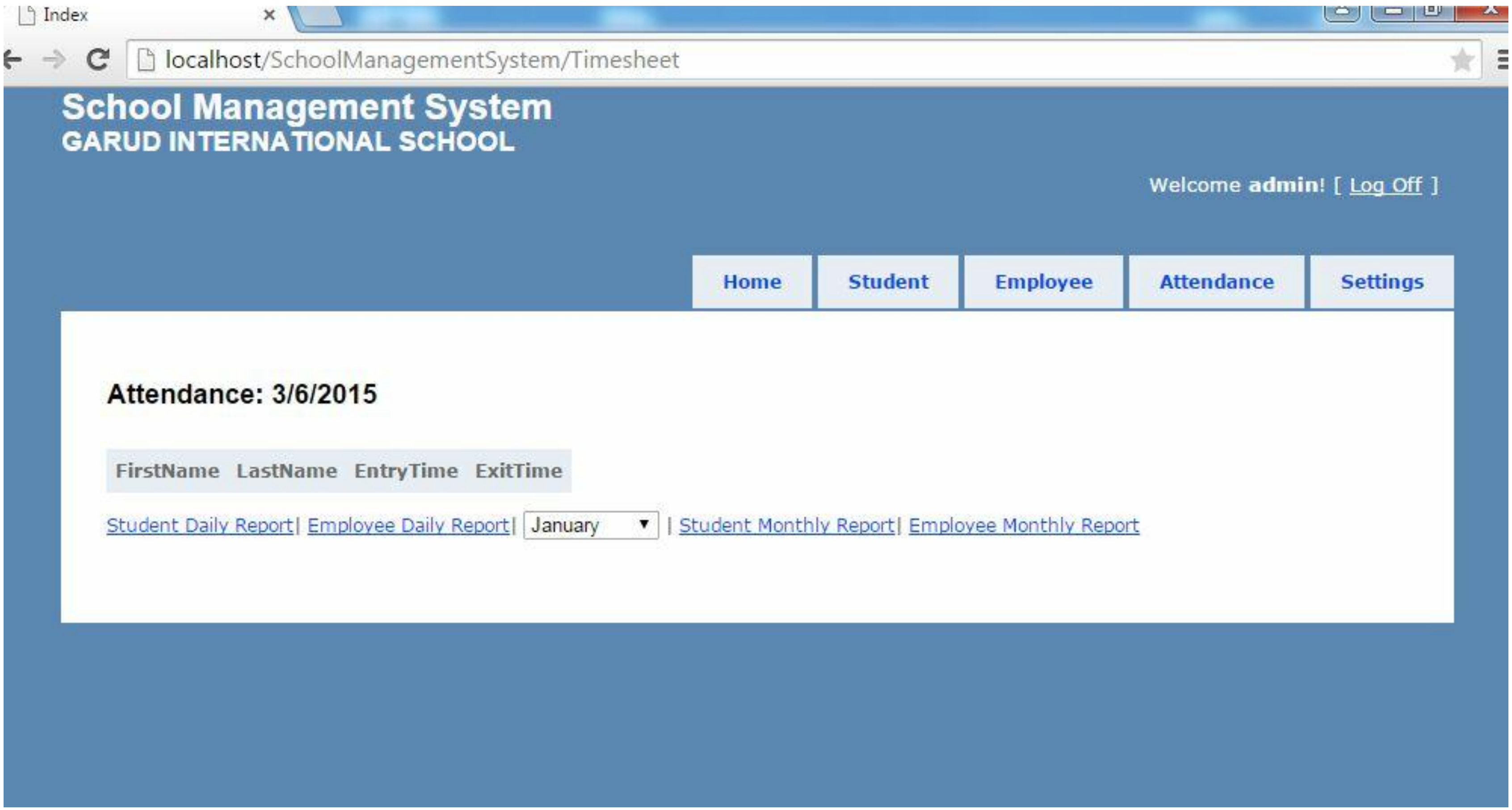
  WE DISCUSSED ONLY FEW
- THANKS A LOT FOR YOUR PATIENCE

QUESTIONS ?

PRODUCT-DEMO

- RFID BASED SCHOOL/COLLEGE MANAGEMENT SYSTEM

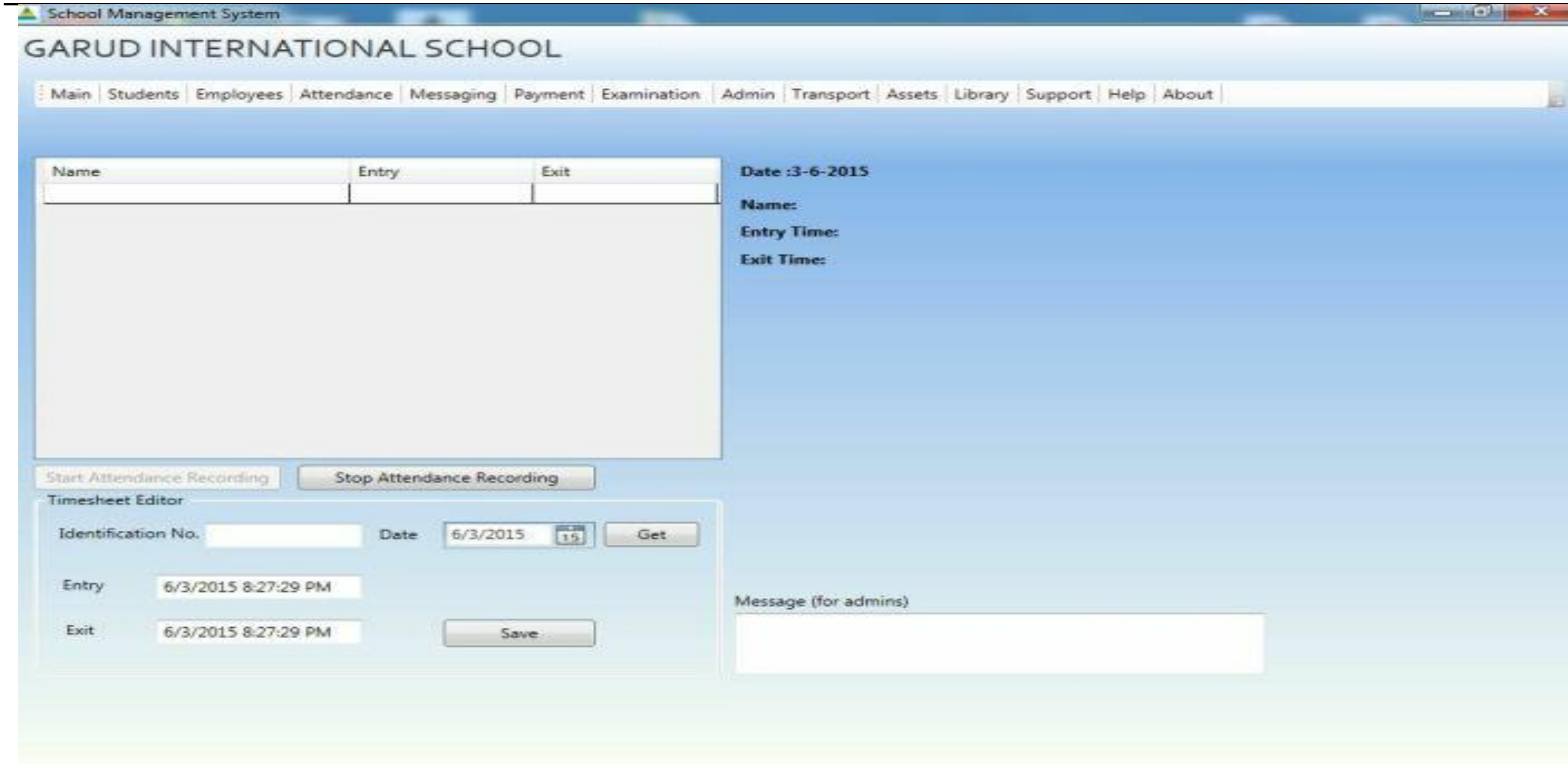
RFID SCHOOL MANAGEMENT SYSTEM- WEB BASED



SCHOOL MANAGEMENT SYSTEM

- AUTOMATIC ATTENDANCE SYSTEM
- STUDENT SECURITY
- AUTOMATIC INFORM PARENTS ON ENTRY/EXIT OF STUDENTS
- AUTOMATIC PAYMENT AND ACCOUNT
- USES SMS SERVICE TO COMMUNICATE TO STUDENTS/PARENTS

RFID SCHOOL MANAGEMENT SYSTEM



OUR PRODUCT-WWW.GARUDSMS.COM

RFID ATTENDANCE RECORDER

THANKS A LOT