

# *CML*

## *Low Power Wireless Modem Solutions*

Presented By :- Tom Mailey and David Falp



# Overview

- **CML Corporate Review**
- **CML High Speed Modems**
  - *FX909B GMSK Modem*
  - *CMX969 ARDIS Modem*
- **CML Wireless RF products**
  - *CMX017 Transmitter*
  - *CMX018 Receiver*
- **Wireless Data Market review**
- **Product Integration**
- **Applications**



# Consumer Microcircuits Ltd



Group Headquarters, Oval Park, Langford, Maldon, Essex. CM9 6WG

## Company Overview



# Consumer Microsystems Plc. Group

- Two ISO9001 Design & Manufacturing companies  
*CML Microcircuits Ltd & MX-COM*
- 40 Graduate Design Engineers World-wide
- 60 Countries supported by local Distributors
- ASIC design centre utilising CMOS, Bi-CMOS & Bi-Polar technologies - *Integrated Micro Systems Ltd (IMS)*
- Sales & Support centre in Singapore servicing Far Eastern countries - *CML Singapore Pte*



# CML's Key Market Areas



**Wireline Telecom**



**Wireless Data**



**RF Products**



**Two-Way Mobile Radio**



**Military Communications**



# Market Breakdown

## *Telecoms*

### Terrestrial systems

- *Feature Phones, PABX, Cordless Phones, Payphones, Fax machines, Modems*

### Rural Telecoms

- *Wireless local loop systems, Pair Gain systems*

### Cellular Telephones

- *NMT, AMPS, TACS*
- *C-Net, R2000 systems*



# Market Breakdown

## *Wireless Data*

### All wireless packet data standards

- *Mobitex, RD-LAP CDPD, TETRA-PDO*

### Private data networks

- *Public utility monitoring systems*
- *Industrial Telemetry systems*
- *Point of sales terminals*
- *Wireless stock control*



# Market Breakdown

## *Mobile Radio*

Mobile radio audio processing PMR systems based on

- *CTCSS, Sub audio signalling*
- *DCS, Sub audio signalling*
- *Selcall, Sequential Tone signal*

Trunked Mobile Radio

- *Audio processing to ETS 300 086*
- *FFSK modems for MPT1327 and other standards*





# Market Breakdown

## *Military/Gen Purpose*

### Military Communications

- *CVSD codecs for Eurocom D1IA8, Mil-Std 188-113*

### General Purpose Products

- *Tone generators*
- *Tone detectors*
- *Voice coding*



# CML Semiconductor Division

## Engineering Design Capability

### Engineers

40 Graduate design engineers world-wide

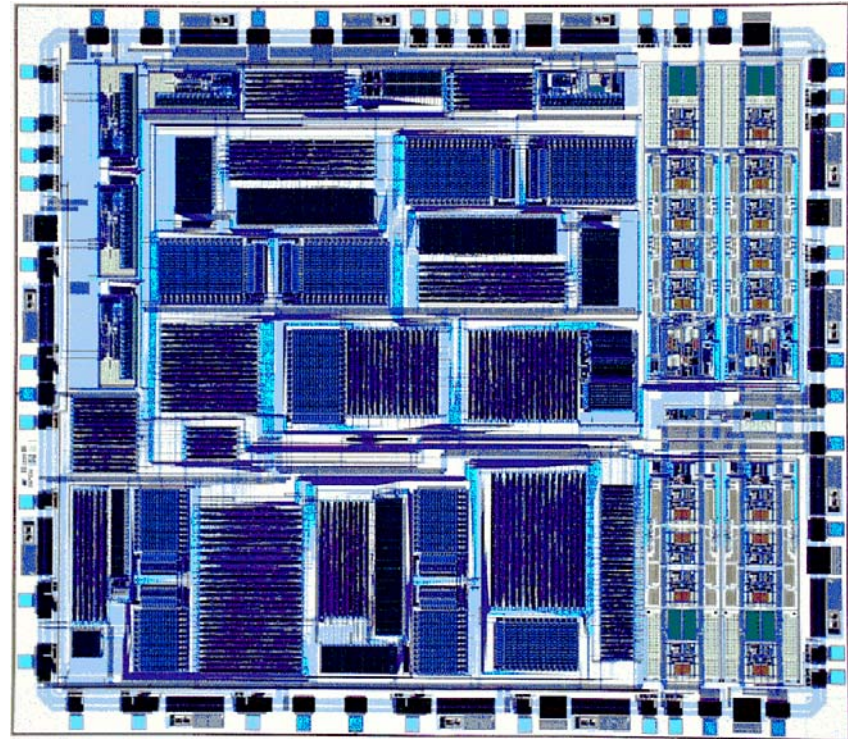
### Design Expertise

Digital, mixed signal and pure analogue

DC to infrared design expertise

### Processes

CMOS, Bi CMOS, Bipolar and GaAs



# CML High Speed Modems

- **FX909B GMSK Packet Data Modem**
- **CMX969 ARDIS Modem**

High speed transfer of data over narrow-band wireless links

FEC, CRC and burst error protection ensures robust data transmission

Easy integration with CMX017 & CMX018 RF chipset



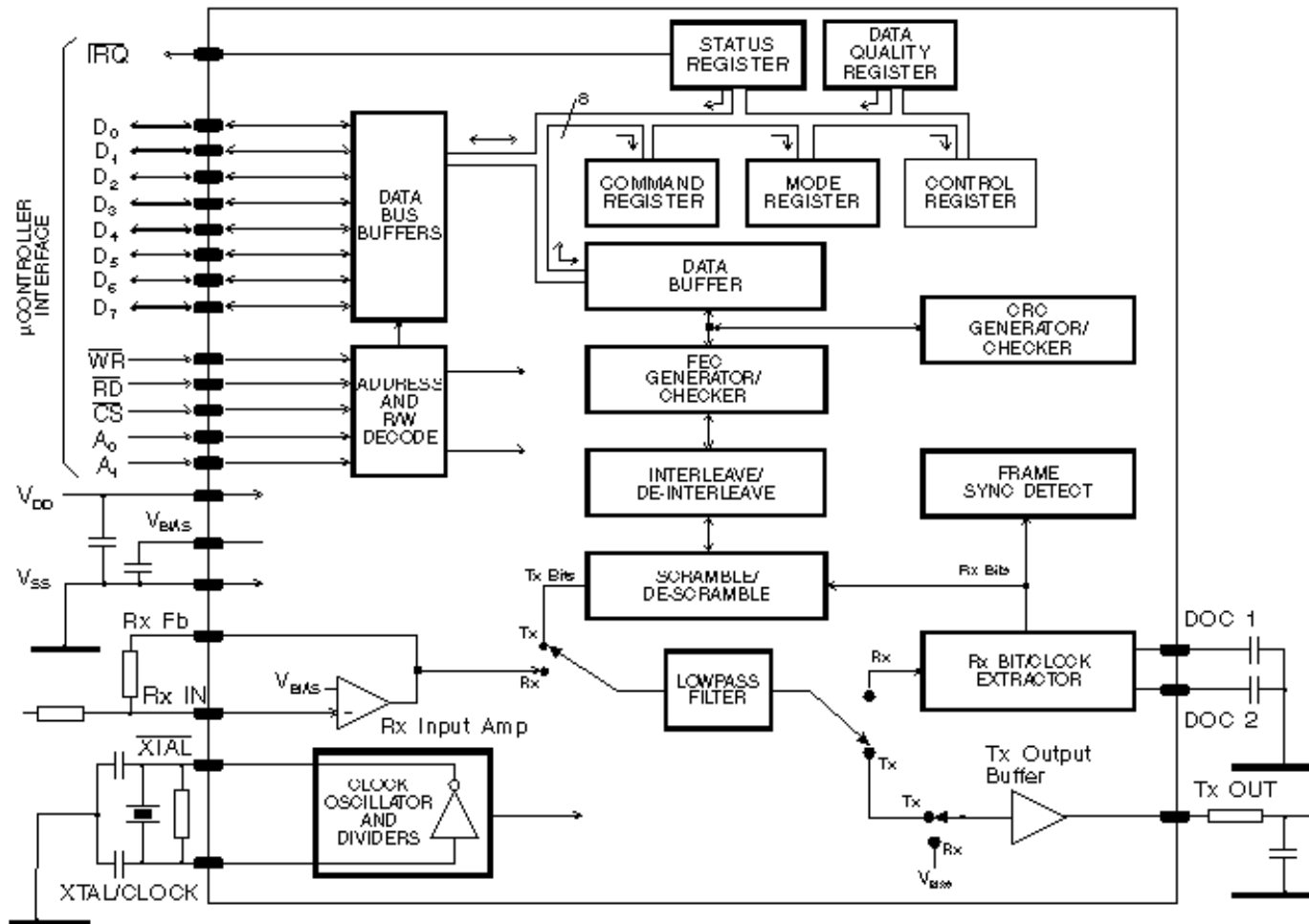
# FX909B (GMSK)

- Rx and Tx Modes from 4kb/s to 38.4kb/s
- Full Data Packet Framing
- Full 'Mobitex' Compatibility incl. R14N short-block frames
- Checksum Generation and Checking
- Parallel uC interface

(Targeted at Mobitex and general high speed wireless data applications)



# FX909B GSM Modem



# CMX969 ARDIS Modem

- DataTAC, ARDIS, Dual Mode RD-LAP and MDC Systems
- 4-Level FSK / GMSK Modulation
- MDC 4.8kb/s, RD-LAP 9.6kb/s to 19.2kb/s
- Low Power (2mA at 3V) with Powersave option

(Targeted at MDC4800  
and RD-LAP)



# CMX017 & CMX018 RF Chipset

- **CMX017 :- RF Transmitter**
- **CMX018 :- RF Receiver**

Excellent compromise between performance and integration

Globally compatible operation:- *865 to 965 MHz*

Excellent integration possibilities with FX909B and CMX969 modems

Wide range of low power wireless applications



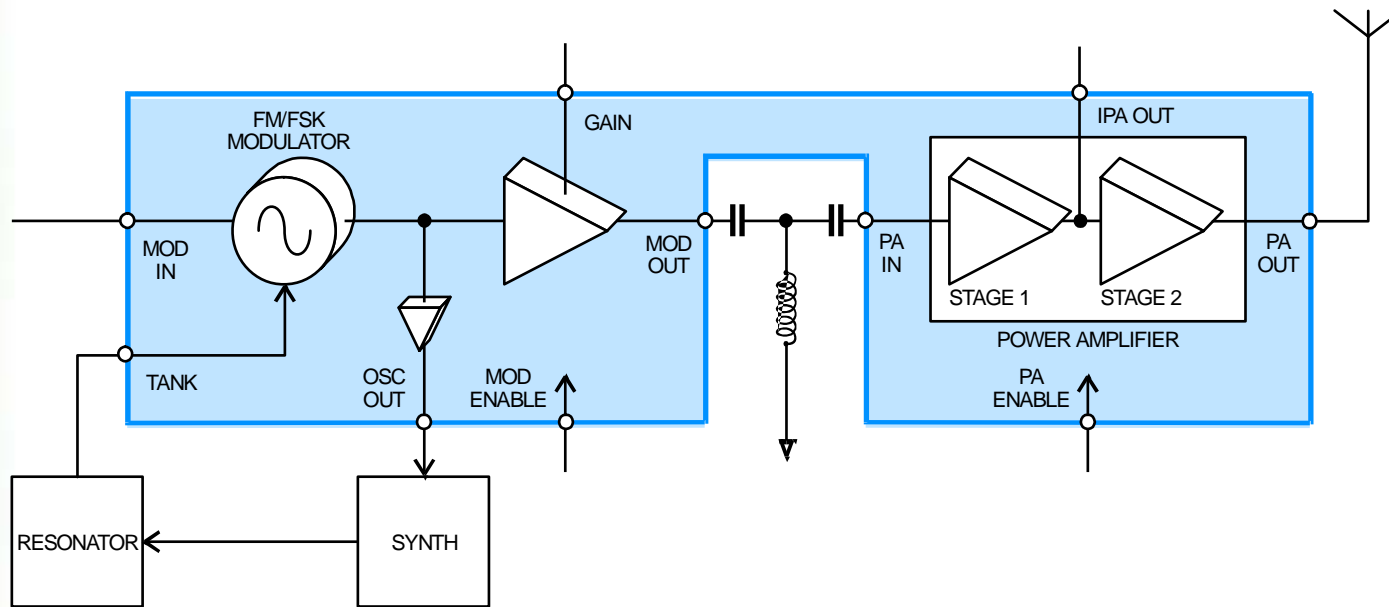
# CMX017 :- *Features*

- Direct FM/FSK Modulator
- Adjustable Modulator Output Power
- Integrated Power Amplifier with Output Power up to +20dBm
- Integrated VCO
- Off chip main varactor and resonator for best phase noise
- Buffered VCO output
- Highly stable power control
- Low Power 3V Operation
- Power Down Mode ( $<10\mu\text{A}$ )
- 28 Pin SSOP Package





# CMX017 UHF Transmitter

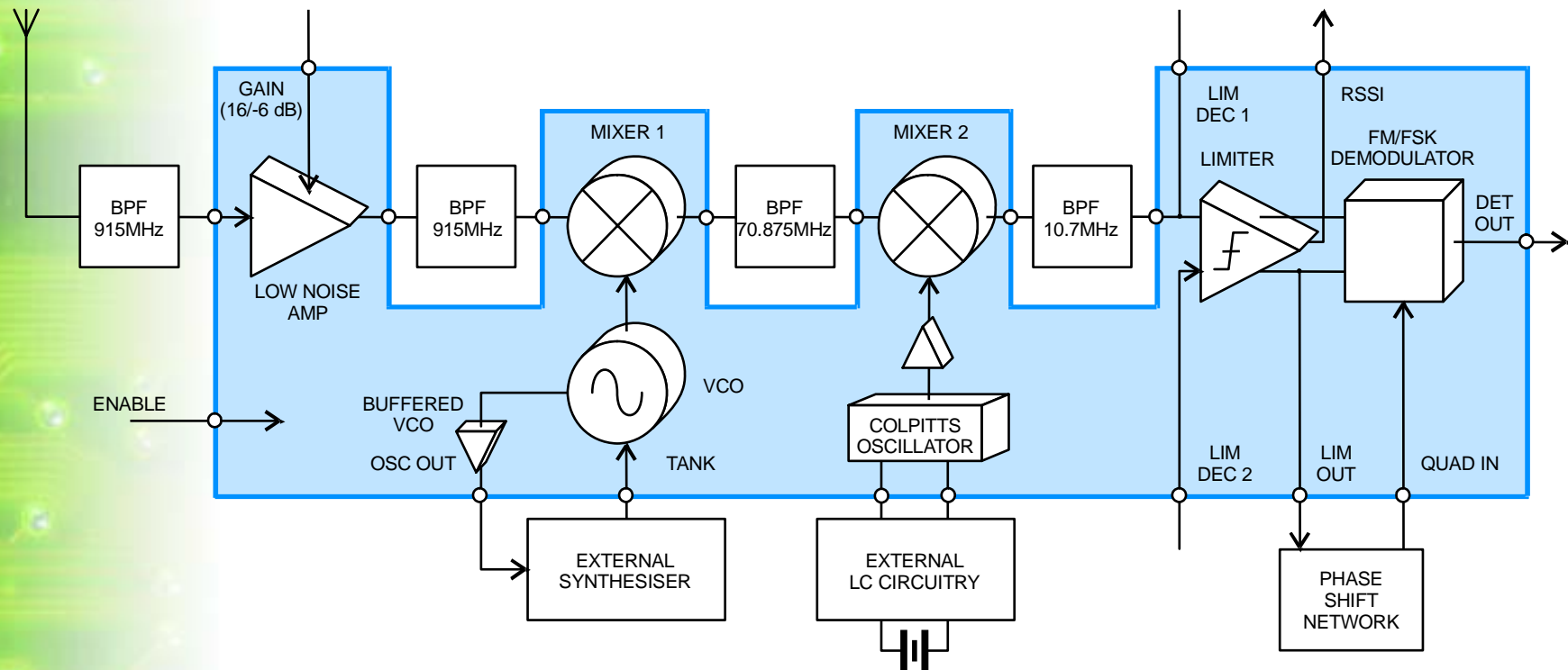


# CMX018 :- *Features*

- Double Conversion Superhet Receiver
- Low Noise Amplifier with Switched Gain
- High Performance UHF Down-Converter
- Integrated VCO
- Narrow-band and Wide-band FM / FSK
- Analogue FM and Digital FSK Demodulator
- Suitable for Data rates of  $< 500$  kb/s
- High Sensitivity Receiver  $-104$ dBm
- Receiver Noise figure 4dB
- High Dynamic range receiver
- 2.7V Operation
- Power Save Mode ( $< 10\mu$ A)
- 28 Pin SSOP Package



# CMX018 UHF Receiver



# Wireless Data Market Review

- Frequency Allocations
- Spectral range
- Transmission & Receive Considerations
- RF products & modems integration
- Applications



# Pan-European Frequency Allocations

- 863-864 MHz identified for cordless headphone applications - CEPT Recommendations T/R 25-08, T/R 72-01, T/R 75-02 refer
- 865-868 MHz identified for cordless microphone applications - CEPT Recommendations T/R 25-08, T/R 72-01, T/R 75-02 refer
- 868-870 MHz identified for future Short Range Devices (Data) applications. CEPT Recommendation T/R 70-03 refers



# Busy Spectrum

- Broadcast Television band extends to 854 MHz
- ETACS analogue cellular starts at 870MHz (UK, Ireland, Spain, Italy, Austria) - mobile transmit
- GSM allocated from 890MHz to 915MHz - mobile transmit
- All these services generate strong interfering signals
- Disruption to these services would be very noticeable



# Important Transmitter Parameters

- High Output power
  - Most single IC transmitters are 5mW to 25mW output power - *CMX017 = 100mW (+20dBm selectable)*
- Low Spurious emissions
  - Radiated spuri affect how good a neighbour you are - *CMX017 has low spurious emissions*
- Low transmitted wide band noise
  - Frequency synthesizers often transmit high levels of wide band noise



# Important Receiver parameters

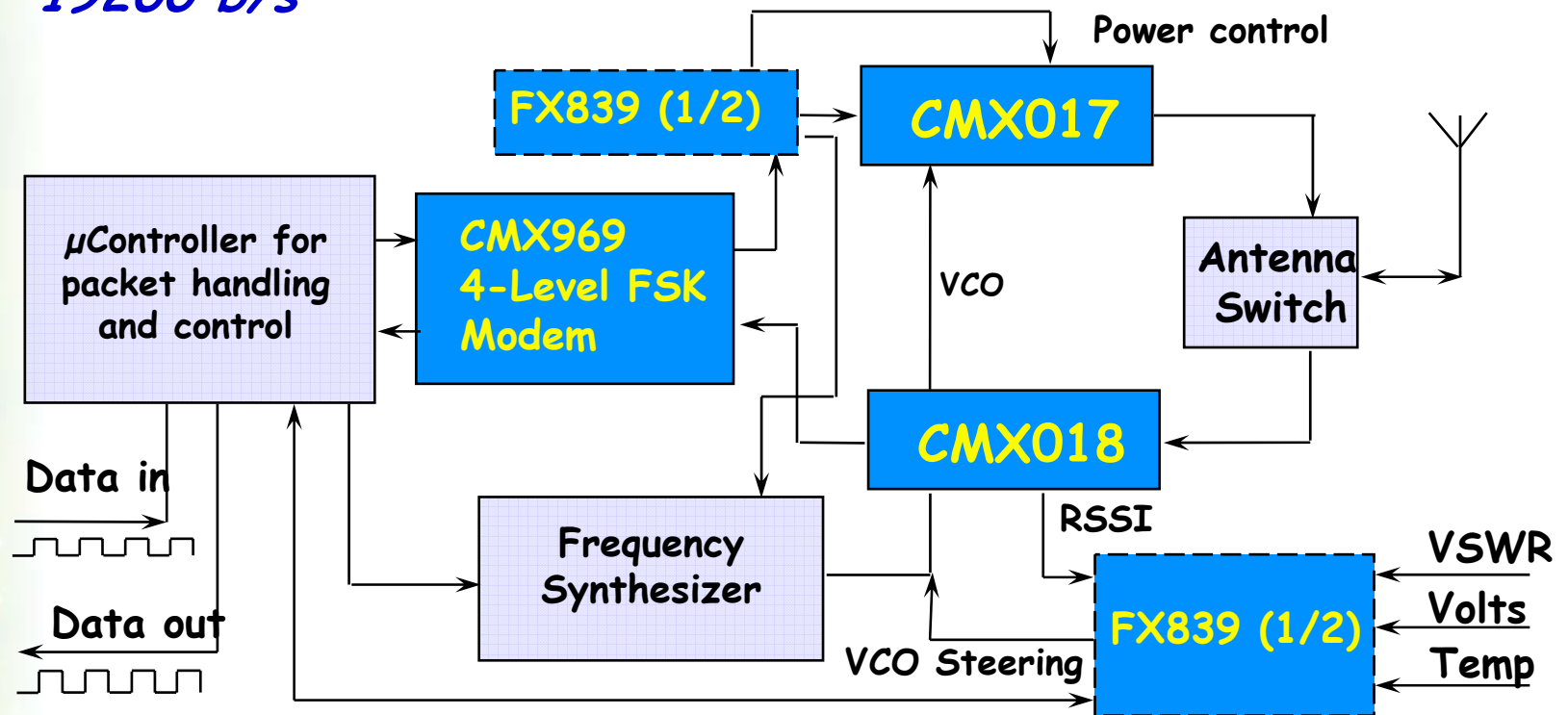
- High Sensitivity
  - Ability to resolve weak signals over the receivers own internal noise - *CMX018 minimum detectable signal -117dBm*
- High Selectivity
  - Ability to choose one signal out of the multitude of radio signals present in a frequency band
- Good Signal Handling
  - Ability to resolve weak signals in the presence of strong interfering signals both in band and out of band





# Integrated products

- *High performance, narrow band (25 kHz) radio modem with Forward Error Correction, adaptive power output control and two point modulation operating at 19200 b/s*



# Applications

- Barcode readers.
- Trackside safety systems.
- Packet data systems e.g.  
*Mobitex, RD-Lap, Data-Tac.*
- Industrial equipment control/metering.
- Computer network radio links.
- POS terminals.



# Applications

- Vehicle security systems
- Vehicle and equipment tracking and monitoring systems.
- Voice encoder systems.

*and many others !!.*



# Applications



# And Finally In Conclusion...

- CML offers an excellent entry into high speed wireless modem markets
- High performance products with low power requirement
- Easy to design-in and use
- Available now and in production

