
## HOT CHIPS SYMPOSIUM

# HOT ROD™

1 Gbit/sec Data Communications

**Jonathan Zierk**
**Gazelle Microcircuits**
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## AGENDA

1. Introduction to Gazelle
2. Communications Trends
3. HOT ROD
4. Communications Media
5. BER Evaluation
6. Support Products
7. Future Products


# INTRODUCTION TO GAZELLE

- Established in August of 1986
- First Revenue in February 1988
- Venture Capital Backing
  - Kleiner Perkins Caufield & Byers
  - Hambrecht & Quist
  - Others
- Corporate Strategy: Enhance the performance of workstations, PCs, and minicomputers with silicon-compatible gallium arsenide.
- Corporate Focus: Low-cost high-volume solutions



INTRODUCTION TO GAZELLE


- Current Product Focus
  - Programmable Logic Devices
    - 125 MHz, 5.5 ns. 22V10
  - Data Communications and Networking
    - 1 Gbit/sec communications
  - System Clocking Solutions
    - Zero $T_{pd}$ clock buffers (25-50 MHz)


# COMMUNICATIONS TRENDS

- In the 1980s, computing power moved out of the mini/mainframe and into the desktop machine.

- In the 1990s, communications between desktop machines and file servers will provide the next significant increase in system performance.

COMMUNICATIONS IS THE BOTTLENECK TODAY



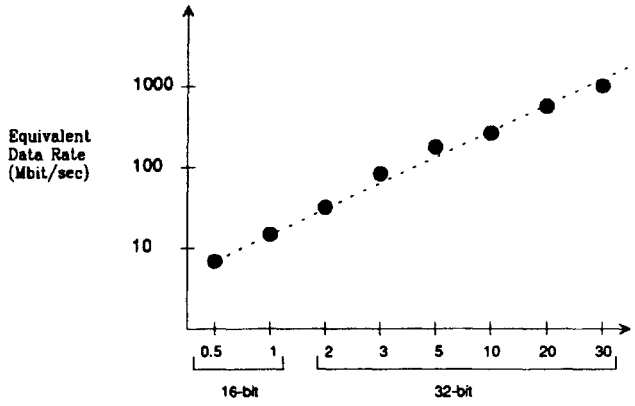

# COMMUNICATIONS TRENDS

- In the 1980s, system performance increases were attributable primarily to the increases in the power of the microprocessors.

- In the 1990s, system performance will be enhanced through multi-processing and parallel processing architectures, relying on the communications to match the data rate of the system.

PERFORMANCE = COMPUTING + COMMUNICATIONS

# COMMUNICATIONS TRENDS

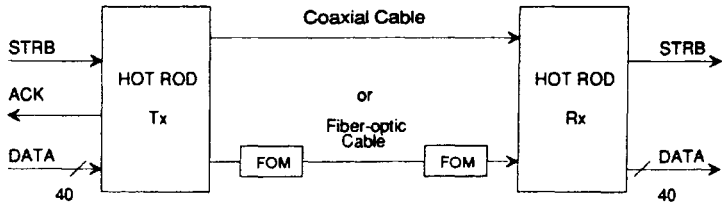



COMMUNICATIONS ADVANCES SEVERELY LAG
COMPUTING ADVANCES



# GAZELLE'S SOLUTION - HOT ROD

- HOT ROD is a two-chip solution
  - No additional components required
- Fiber-optic and coax compatible
- 40-bit TTL-Level Data bus
  - Compatible with 32-bit uP systems
- Selectable data rates from 200-1000 Mbit/s



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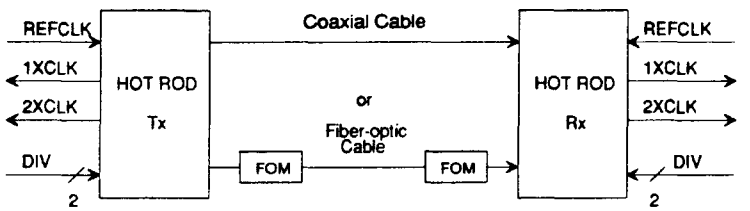
# HOT ROD - CLOCKING

- Only one reference signal required
  - 20-25 MHz TTL REFCLK
- All system interface signals TTL level
  - 25 MHz maximum frequency
  - High-speed serial clock generated on chip
- Synchronous 1x, 2x clocks generated
- Receiver recovers clock and data
  - On-chip PLL operates up to 1.25 GBaud



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# HOT ROD

USER FEATURES

1) TTL System Interface
   - Maximum frequency of 25 MHz
2) +5V supply
3) Strobe/Acknowledge Interface
4) Synchronous Interface Option
   - Permits state machine/control interfaces
5) 40-bit Data Bus
   - Compatible with 32-bit uP systems
   - All bits are user-definable


# HOT ROD

USER FEATURES

6) Built-in Loopback port
   - Allows system level power-up test

7) Fly-By™ termination
   - Relieves board layout constraints

8) Interface Cards for quick evaluation/prototype
   - Provides proven production solution

9) Development System
   - Allows characterization
   - Doubles as production test tool


# COMMUNICATIONS MEDIA

- Coax-compatible interface
  - Differential PECL-Level interface
  - Capable of driving up to 100 feet

- Fly-By™ Termination eases board design
  - Termination restrictions alleviated
  - Reflections minimized

- Fiber-Optic compatible interface
  - Directly drives fiber-optic module interfaces
  - Compatible with LED and LASER drivers


# BER EVALUATION

1) Gazelle internal BER evaluation (500 MBaud)
   - Media: RG174 Distance: 20 feet
   - Time: 50 days, uninterrupted
   - Observed BER: $2.14 \times 10^{-15}$

2) Government contractor evaluation (500 Mbaud)
   - Media: RG8 Distance: 50 feet
   - Time: 1 week, various tests
   - Observed BER: $1 \times 10^{-12}$

3) Sandia Labs internal evaluation (1000 MBaud)
   - Media: Fiber Distance: 7 Kilometers
   - Time: 1 week, uninterrupted
   - Observed BER: $6 \times 10^{-14}$

NO ERRORS WERE OBSERVED


# SUPPORT PRODUCTS

- Gazelle offers a family of board-level products to support the design-in and evaluation of the HOT ROD chipset across coax and fiber media.

- HOT ROD Coax Interface Cards
  - 400, 500 and 1000 Mbit cards

- HOT ROD Fiber-Optic Interface Cards
  - 250 Mbit today, 1000 Mbit by year-end

- HOT ROD Development System
  - BER evaluation across media, speed, environment, data pattern
  - System debugging capabilities built-in


# FUTURE PRODUCTS

- Industry Standard Solutions
  - Serial versions of the HIPPI standard
  - Fiber Channel solutions

- Networking Solutions
  - Proprietary networking chipsets/protocols
  - Headed toward 1 Gbit/sec LAN

- Increased performance
  - 1.5 Gbit/sec versions in 1991

- Architectural variations