Arrive - Virtual ASIC CodeChips for IP Packet Transport Networks

July 2013

About Arrive

- Arrive is a broadband semiconductor solutions company with a broad portfolio of systems-on-a-chip products combining voice, data, Internet, and multimedia content.

  - Arrive team formed from Motorola/Next Level Communications in 2001.
  - Management team with long history in circuit- and packet-switched technologies, combined with worldwide carrier-class systems design experience.
  - 120 engineer world-class design team located in Ho Chi Minh City Vietnam.
  - Proven execution and support at Tier-1 & Tier-2 customers.
  - Displacing major competitors at Tier-1 & Tier-2 customers.
  - ASIC and CodeChip™ product lines.

- Customer support from both US Support Team and Vietnam R&D Team

- Arrive is a member of the Altera Design Services Network

The Changing Worldwide Semiconductor Marketplace

- Communications ASIC (fixed silicon) market is extremely large (~$50 billion).

- Services are now leading the networks and standards are changing very quickly resulting in multiple products with shorter life cycles.

- Fixed ASICs cannot accommodate these changes: not flexible, very long development times, very high development costs.

- FPGAs in combination with system-on-a-chip CodeChips have the following attributes: flexibility, short development times, low development costs, and capabilities/costs that match or exceed fixed ASICs in many applications.

- A good portion of the communication fixed ASIC market will be replaced by FPGAs and CodeChips (~$10 billion).

Arrive CodeChips™

- CodeChips are system-on-a-chip integrated circuits (flexible ASIC) placed onto flexible platforms, as compared to traditional ASICs that are permanently fabricated onto silicon.

- A typical traditional ASIC design cycle can take up to 30 months. Arrive's CodeChips can be production-ready in 7 months or less. This reduces time-to-market by up to 75%.
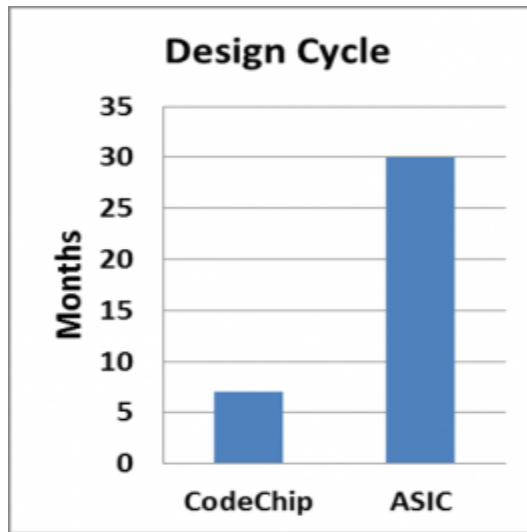
Design Cycle		
	Months	
Design Step	CodeChip	ASIC
Architecture	2	4
Design	2	8
Simulation	1	3
ASIC FAB	0	9
HW/SW Design	2	6
Total	7	30

Arrive CodeChip Process

- Arrive begins the development process by customizing the CodeChip to the customer's specifications and then integrates the CodeChip into their system.

- At the end of this development process, Arrive delivers a CodeChip image to the customer electronically.

- Customer downloads the CodeChip in the appropriate storage location on their board.

- The CodeChip is then downloaded into the FPGA(s) on the board.

- An Arrive keychip (small IC) is required for each FPGA(s) in order for the FPGA(s) to activate all of the CodeChip features.

- Each CodeChip requires an individual keychip.

Arrive CodeChip Products

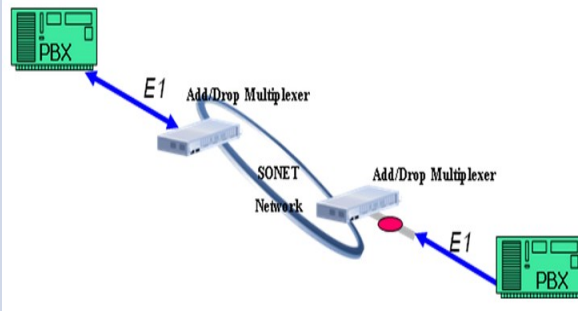| SONET/SDH CodeChips	Pseudowire CodeChips	Carrier Ethernet CodeChips	Software Defined Networking CodeChips
SONET/SDH CodeChips A carrier-class *circuit switch* that provides switching, redundancy, scalability and network management.	**Pseudowire CodeChips** Pseudowire allows existing legacy services to be carried on new packet networks: 2G/3G services over 4G networks.	**CE CodeChips** A carrier-class *packet switch* that provides switching, redundancy, scalability and network management.	**SDN CodeChips*** A carrier-class *packet switch* that provides centralized network management using FreeFlo™ capabilities.

* Product Details Not Yet Released
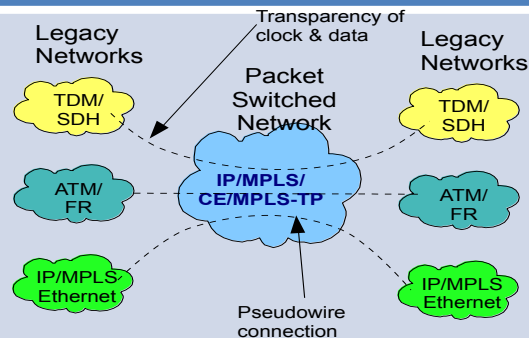
SONET/SDH, Pseudowire, Carrier Ethernet

Telecom infrastructure has evolved through three major technologies in 30+ years
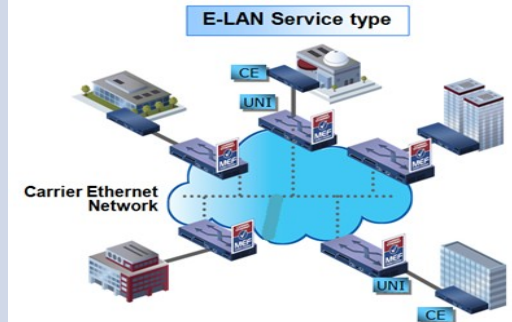
SONET/SDH/PDH (Circuit Switched)	Pseudowire	Carrier Ethernet (Packet Switched)
• Telephone and PBX • High-speed Internet • Metro SONET/SDH Ring • Enterprise telecom and Industrial telecom	• 3G Mobile Backhaul • Replacement for TDM, SDH, ATM, Frame Relay, PPP • MLPPP layer for WAN Routers	• Leased Lines for Business • 4G Mobile Backhaul • WAN Routers and WAN Switches • Cloud Computing

Arrive SONET/SDH CodeChips

- **Line Interfaces**
  - E1/T1, E3/T3
  - STM-1, STM-4
  - SPI-3
  - Ethernet 100M/1GbE

- **Protocol stack**
  - E1/T1, E3/T3, STM-1/4, 64K (DS0), Ethernet
  - X-connect, ADM, LCAS, GFP, HDLC, PPP, BCP
  - EoS, EoPDH, EoPoS, PoS
  - 50ms APS protection
  - Clock Synthesizer

- **Advantages**
  - Complete solution: both FPGA and high-level Software
  - Complete protocol and interfaces
  - Single low-cost FPGA, reducing the BOM
  - Hardware-based processing

SONET/SDH CodeChip Availability

SONET/SDH CodeChip™	Bandwidth	Key Features	Availability
AF4-8E1-EoPDH	**2xT3/E3 or 8xT1/E1**	• 2xT3/E3 or 8xT1/E1 • OIF-SPI-3 • EoPDH VCAT-LCAS Mapper	Now
AF4-STM1-ADM	**STM-1/OC-3**	• 2xOC-3/STM-1 • Channelized Ethernet over TDM (EoS, EoPoS) VCAT-LCAS, GFP-F	Now
AF4-4STM1-PDH ADM	**STM-1/OC-3**	• 4xOC-3/STM-1 • Linear ADM T1/E1 over SONET/SDH • Full T1/E1 framer without M13/E13	Now
AF4-STM4-EoS	**STM-4/OC-12**	• 2xOC-12/STM-4 or 4xOC-3/STM-1, 1+1 MSP • Channelized Ethernet over TDM (EoS, EoPoS) VCAT-LCAS, GFP-F	Now
AF4-STM4-ADM	**STM-4/OC-12**	• 4xOC-12/STM-4/OC-3/STM-1 • ADM 10K DS0 Cross-Connect	Now

Arrive Pseudowire CodeChips

- **Line Interfaces**
  - E1/T1, E3/T3
  - STM-1, STM-4
  - Ethernet 100M/1GbE

- **Protocol stack**
  - CES (SAToP/CESoP), CEP
  - Pseudo wire ATM, IMA, Frame Relay, MLFR
  - PPP, MLPPP, IP, Ethernet
  - Clocking: ACR, DCR, line, system
  - 50ms protection, VCCV

- **Advantages**
  - Complete solution both FPGA and high-level Software
  - Complete protocol and interfaces
  - Single low-cost FPGA, reducing the BOM
  - Hardware-based processing

Pseudowire CodeChip Availability

Pseudowire CodeChip™	Line Interfaces	Key Features	Availability
AF6-32E1-CES AF6-32E1-ATM/IMA AF6-32E1-PPP/MLPPP	**32xE1/T1/J1**	• CES • ATM/IMA • PPP/MLPPP, Frame Relay, MLFR	Now
AF6-4STM1-CES AF6-4STM1-CEP AF6-4STM1-ATM/IMA AF6-4STM1-PPP/MLPPP	**4xSTM-1 1xSTM-4**	• CES • CEP • VC4, SAR AAL5 • ATM/IMA • PPP/MLPPP, Frame Relay, MLFR	Now
AF6-8STM1-CES/CEP	**8xSTM-1 2xSTM-4**	• CES • CEP	Now
AF6-16STM1-CES/CEP	**16xSTM-1 4xSTM-4 1xSTM-16**	• CES • CEP	Now

Arrive Carrier Ethernet CodeChips

- **Line interfaces**
  - Ethernet 100M, 1GbE, 10GbE
  - XAUI, Interlaken
  - PCIe Gen1 (2.5G)
  - E1/T1

- **Advantages**
  - Full solution both FPGA and high-level Software
  - Complete protocol and interfaces
  - Single low-cost FPGA, reducing the BOM
  - Hardware-based processing
  - Future-Proof

- **Protocol Stack**
  - MEF Carrier Ethernet 2.0
  - Ethernet, PCS
  - VLAN, Q-in-Q, MPLS-TP, MPLS, IP, VPN
  - OAM, Protection
  - 1588v2, Sync-E and Clock synchronizer
  - CES pseudowire

Carrier Ethernet/SDN CodeChip Availability

CE CodeChip™	Throughput	32x E1/T1 CES	Availability
CE24	24GbE	Included	July 2013
CE50	50GbE	Included	November 2013
CE100	100GbE	Optional	March 2014
SDN	--	--	May 2014

Success Stories

Success Stories

Major Chinese Telecom Equipment Manufacturer

- Arrive has won every RFQ and beaten every competitor, including LSI, PMC/Wintegra, and Siverge.

- Arrive has over 15 design wins at this customer.

- Arrive's products are being used in wireline, wireless network, wireless backhaul, and enterprise applications.

- Arrive's products are slated for telecom and utility customers which include China Mobile, China Unicom and China Telecom.

- Arrive's products are associated with the sale of tens of thousands of Altera FPGAs.

Success Stories

Chinese Division of a Multi-National Tier 1 Company

- Arrive and Altera offered a joint solution and competed directly against many competitors, including Xilinx/Chenxiao.

- A key deciding factor: this customer needed Arrive's systems level knowledge to integrate their software with our CodeChip.

- Arrive is doing 7 different CodeChip designs for this customer using a Cyclone V platform.

- This customer's products are slated for China Mobile, China Unicom and China Telecom. They will also be offered worldwide after the initial launch.

Success Stories

Why is Arrive achieving this success?

- We build great CodeChips - large SoC Flexible ASICs.

- We have very competitive pricing and consider ourselves a price leader in this market segment.

- We have great technical customer support.

- We have great systems engineering knowledge, much of it learned from our previous experience as system developers at Next Level/Motorola. This allows us to integrate our flexible CodeChips into customer's new and existing products in ways that our competitors cannot match.

Customer Buying Process

There are two ways that customers can buy our products through distribution:

Unbundled:

- FPGA and CodeChip prices are negotiated separately with the customer.

- Distributor sells the FPGA and CodeChips individually at the negotiated price to the customer.

- The customer pays the distributor who in turn pays each company individually.

Bundled:

- Customer negotiates single price for FPGA and CodeChip combined.

- The distributor bundles the FPGA and CodeChip together with a single part number at the negotiated price.

- Distributor is informed of the price split between the FPGA and CodeChip.

- Customer pays the distributor, who in turn pays each company individually.

- The customer does not know the individual prices of the FPGA and CodeChip but only the combined price.

Contact

LiaoXiaoQing(廖小情) , Sr. Field Applications Engineer & Business Manager

Mobile: (+86) 189-1798-4311

Email: liao@arrivetechnologies.com

http://www.arrivetechnologies.com/contact-us/

Arrive Website:

English: http://www.arrivetechnologies.com

Chinese: http://www.arrivetechnologies.com/cn/

A listing of our products, include data sheets and basic product specs, is available on the Arrive Website.

Thank You