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Due Diligence: Alphamosaic

By ***The Chilli*** analysts

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Introduction

Alphamosaic is a Cambridge, UK-based post-R3 fabless chip startup. It was founded in April 2001 as a spinout from Cambridge Consultants Limited (CCL).

Alphamosaic has developed an integrated multimedia processor with embedded software. It is targeted primarily at high-end mobile feature phones, which feature multimedia messaging (MMS), video, audio and polyphonic ringtones. The company is shipping its first product now and will shortly announce a second product. It is in the midst of designing-in its products into several customers in Asia, and already has Samsung as a tier-one volume customer.

Vital statistics

The CEO is Jalal Bagherli, formerly managing director of Sony Semiconductors and Devices Europe, where he generated turnover of EU330M and created a design centre of 100 engineers designing ARM-based processor and RF systems. He joined in Alphamosaic in August 2001.

The principal founders are Steve Barlow, CTO, and Dr. Robert Swann, VP of marketing. Both were previously at CCL, where they had been involved in a project to develop a videophone for the mobile network operator (MNO) Orange. The experience of that project informed the development of the technology that was later to be spun out as Alphamosaic.

Bagherli, Barlow and Swann all sit on the board, with CFO John Behrendent as board secretary. Other executives include VP of sales and business development Alan Henderson, formerly of Sierra Semiconductor, Keith Walker, VP of manufacturing, formerly of 3Com.

Non-executive chairman is Mike McTighe, formerly of Cable & Wireless, Philips and Motorola. In addition to McTighe, Bagherli, Swann and Barlow, the board consists of Dr. John Read, formerly of GEC Plessey Semiconductors (now Zarlink), with an investment board consisting of the principal investors, and a technical advisory group consisting of John Hambridge, an operations expert, and Professor Alan Mycroft of Cambridge University and Professor David May of Bristol University.

The company received seed funding of $2.9M from Prelude Ventures and CCL in July 2001. R1 funding of $7.5M came from Prelude, CCL, TTP Ventures and ACT in November 2001. R2 funding of $12M came in May 2003 from Doughty Hanson and existing investors,

with an R3 round of $9m coming in March 2004 from existing investors. Just under 25% is retained by staff and employees.

This total funding to date of $31.4M is in the right ballpark for a digital (as opposed to mixed signal or RF) fabless startup to breakeven, as analysed in the final part of ***The Chilli's*** special report on semiconductor intellectual property (SIP).

Sales in 2003 were $8.7M and the guidance for 2004 is to reach three to four times that revenue level. The company expects to breakeven late 2004, early 2005.

The company currently has 47 staff, with 30 in R & D, 5 in manufacturing and logistics, 5 in IT/facilities and the balance in sales and marketing. All staff are based in the Cambridge HQ. The company uses reps and distributors in its main regions of commercial engagement in Taiwan, Korea and Japan, where local language support is crucial. The company plans to expand headcount to 60 through 2004 in the areas of applications engineering and customer support.

The company has filed 13 patents, which are pending, in the area of low-power video processing.

Value proposition

So what is a feature phone? Basically, it's a mobile phone that supports voice calls, SMS (short message service, or 'text' messages), EMS (enhanced messaging service, e.g. icons, sounds, etc), MMS (multimedia messaging service, e.g. photos, polyphonic ringtones, audio/video clips), MP3, MPEG4 and 2D/3D gaming. This is distinct from a smart phone, which is a hybrid of mobile phone and PDA (personal digital assistant).

To implement that level of functionality requires two subsystems. Firstly, a baseband processor to process the voice calls, with an RF (radio frequency) transceiver, PA (power amplifier) and memory, with controlling software. This is standard for all mobile phones. The second subsystem is for multimedia, containing a multimedia companion chip for ringtones, audio/video clips and still images, a camera (either CMOS imager or CCD camera), stereo CODEC and an LCD controller. The BOM (bill of material) for the baseband and multimedia subsystems are in the $40 region. Alphamosaic expect to reduce this by several dollars over the next 6 months, partly through a tailored architecture, but also through Integration of previously discrete parts, e.g. ringtone generator and memory.

The multimedia subsystem can offload the baseband subsystem, and to do this, the two need to be closely coupled and synchronised both in the hardware and software domains.

The addition of a multimedia subsystem potentially increases the BOM (bill of material) cost, power consumption and heat dissipation - thorny issues for a battery-powered handheld consumer product.

Alphamosaic has developed its technology VideoCore, to provide the multimedia capability at low power consumption. The development team made several observations of past solutions:

- Fixed solutions are not re-programmable to adapt to changing standards
- General purpose solutions, often based around a conventional embedded microprocessor with hardware accelerators, are not tailored for the specialised processing required for video, so must be run at a high frequency, increasing power consumption and heat dissipation

VideoCore was designed to be a fully programmable vector digital signal processor (DSP), specifically targeted at multimedia applications. The processor core is itself in two parts, a vector unit for audio/video data processing, and a scalar unit for conventional data

processing. Both units are proprietary technology, and are closely coupled so that they can access eachother within a single cycle, thus improving throughput. With its hardware specifically targeted at this area, the VideoCore can perform more useful, relevant processing work per clock cycle.

The first device based on VideoCore is the VC01, a single-chip device integrated with 1MB of static RAM (SRAM). The device is capable of processing audio (MIDI player for ringtones, etc), video (MPEG4), provides graphics acceleration (for games) and has an LCD controller, with interfaces for camera input and external memory. Excluding memory and peripherals, the gate count is around 600K gates. It is implemented in 0.13 micron CMOS, using TSMC as the foundry. According to the CEO Bagherli, 'We were able to ship first silicon within $10M of funding in November 2002, and got the mask right first time, with just one metal change - out of necessity.'

Bagherli states that , 'VC01 has the lowest power dissipation in its field. Comparing like for like, video input from the camera, processing it and storing it in memory at MPEG 4 common input format (CIF) at 30 frames/sec, dissipates only 54mW - our competitors are four to ten times higher.'

The VC01 can be addressed by the baseband system as a normal peripheral device. A small piece of embedded software needs to be executed by the baseband to enable it to work with VC01.

The VC01 comes with middleware (audio/video CODECs, image processing and 3D gaming libraries) optimised for the device and a development kit. Evaluation, development and production licenses are available for the software. According to Bagherli, 'We provide a basic multimedia bundle of middleware as part of the upfront NRE to work with a customer. Any extra applications and games software packages are provided at a one off price. This could be up to $250K.'

The company recently completed development of the second generation of VideoCore, which will be the basis of new devices to attack different price points.

The company has developed some games in-house, and has also partnered with several games developers, with the aim of releasing one new game per phone launch, to help the handset customers differentiate themselves.

Competition

There are a number of competitors in this space, and like Alphamosaic, deployed in real products in the marketplace.

Renesas (the entity formed by the Merger of Hitachi's and Mitsubishi's semiconductor divisions) has the SH-Mobile series of processors, combining a SuperH processor core with graphics and video SIP. The SH-Mobile3, featuring a low-power SH4 core, is sampling at approximately $35. A lower cost variant, SH-MobileL, using an SH3-DSP core, is available, although it has very limited graphics capability. The SH-Mobile series have been Renesas' success in entering the mobile phone market, building on it's business in SAW filters, power amplifiers, etc, after Hitachi lost the baseband slot in Nokia to ARM in the late 1990s.

TI, dominant in baseband, could become a threat if it chooses to migrate its high-end smart phone solutions downstream into the feature phone segment.

Other competitors include several companies, including Atsana, Neomagic, Emblaze and Nvidia. ***Atsana*** (formerly Lumic) of Canada, is a post-R2 startup, funded to the tune of $24M and offers two devices, both pairing a proprietary vector processor with an ARM9 core. Atsana's solutions have high power dissipation than Alphamosaics' VC01. The company has ported Synergenix Interactive's gaming software platform to its device.

Neomagic, a NASDAQ listed company, announced the MiMagic6 (with an integrated ARM core), claiming prices sub $18 in volume. The company claims to have a design win for an earlier device with TCL in China, and some design wins for smart phones for its latest device, but following an IPO in 1997 (after being founded in 1993), the company is still racking up losses, with a Q1/04 losses of $7M, against sales of only $651K.

Emblaze Semiconductor is part of the LSE-listed Emblaze Limited. Claimed design wins include Dbtel, Telson and Ningbo Bird. Pity the Emblaze investors, who have to read the 2003 annual report, in the kitsch style of Hollywood action movies and thrillers, with the exec team cast as characters - bread and circuses anyone? The group made a net loss of $46M for 2003, having IPO'd in 1996. However, Emblaze also owns Emblaze Mobile (formerly AlphaCell Wireless) a mobile phone ODM (original design manufacturer) and Emblaze Systems, a provider of content delivery systems, including a handset-based media player. These strengths could influence or detract design wins for their semiconductor division.

The Chilli perspective

Feature phones are now shipping in volume, but the increased BOM cost require a greater level of subsidy from the mobile network operators (MNOs) at a time when average revenues per user (ARPU) from data services, excluding text messaging, are tiny (see part one of ***The Chilli*** report on MMS in the next issue). This will lead to greater pressure on BOM costs, and the growth in white label handsets, as well as a relaxation in MNOs subsidies.

The company appears to have a competitive edge in terms of BOM cost, shipping a real product, power consumption and a tier one design win (with Samsung). In pure hardware terms, this is encouraging. Looking at the feature phone as a platform for value-added software applications reveals a few challenges that need to be addressed.

There are many small software development houses targeting the mobile space. It is not economically viable for them to target multiple hardware platforms with their application software. Anyone who can provide an adequate third party support, training and tools infrastructure can gain rapid momentum from the development community, especially if there is some strong brand name handset makers and MNOs behind the programme.

Large semiconductor vendors such as TI and Renesas have licensed multimedia SIP (semiconductor intellectual property) from Imagination Technologies, who have experience of gaming technology through their association with Sega. They could emerge as a strong player with their large manufacturing and partnership infrastructure. The top branded mobile handset makers may be difficult for a startup to penetrate and maintain, unless they have a compelling feature, which the others cannot deliver. Alphamosaic have proven that not only can they penetrate large branded handset makers but also have enough differentiators in their product offering to provide some compelling reasons.

In terms of a way forward, the company should leverage its tier one design wins and complete a few white label deals before the end of 2004. Given the likely emergence of white label handsets, Alphamosaic should aim to penetrate ODMs in the Far East and hustle to be designed into reference designs, on the back of lower cost variants of its VideoCore technology. On the partnership side, the company needs to invest more resources to gain further traction with games and application developers.

If on top of that, if it maintains a careful eye on the burn rate and keep its costs in line, with revenues, garner higher gross margins than its competitors, then it should be in a good position to prepare for a successful exit, and even contemplate doing an IPO in the not too a distance future.

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