

## Chip Start-Ups Battle to Provide Network Flexibility for Cellphones

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A new breed of startups is closing in on a high-tech holy grail: chips that could help cellphones jump between different communications networks to give users the best service.

Sandbridge Technologies, after four years of effort on Monday is announcing that it has completed the design of a chameleon-like chip that can communicate using different kinds of cellular technologies as well as fast wireless networks such as Wi-Fi. The approach uses software to give cellphones multiple capabilities, which can be modified after they are sold rather than having features set permanently in hardware.

<b>Flexible Phones</b>		
Chip start-ups race to deliver new cellphone features		
COMPANY/ LOCATION	FOCUS	FUNDING, IN MILLIONS
<b>Sandbridge</b> White Plains, N.Y.	Uses software to shift between cellular networks	\$40
<b>PicoChip</b> Bath, U.K.	Chip has 300 speci- alized processors	\$41.5
<b>3Plus1</b> Saratoga, Calif.	Focuses on price, performance and power consumption	Not disclosed
<b>Icera</b> Bristol, U.K.	Uses software to shift between cellular networks	\$42.5

Sources: company reports; Unstrung Insider

"We can implement the entire system in software and it works," said Guenter Weinberger, chief executive of the White Plains, New York, start-up. "That is one of the breakthroughs." Sandbridge's initial shipments of sample chips went to cellphone makers it won't yet identify, Mr. Weinberger said, with phones based on its technology expected next year.

PicoChip Designs Ltd., of Bath, England, says it is already mass-producing programmable chips, focusing on the base stations that coordinate cellular networks. Icera Inc., based in nearby Bristol, says it has attracted interest from undisclosed handset makers in its own programmable chips. 3Plus1 Technologies Inc., a Silicon Valley startup, expects to deliver comparable technology early next year.

Backers of such "software-defined" chips believe they will hasten the arrival of multi-function phones and other portable devices that can do tricks like watching broadcast TV and surfing the Web at the speeds of home broadband connections. They hope to grab a chunk of a cellular chip market that totaled \$22.4 billion in 2004, according to Forward Concepts, a market-research firm in Tempe, Ariz.

But the startups face formidable competition. Giants such as **Texas Instruments Inc.** and **Qualcomm Inc.**, for example, are quickly making their own cellphone chips more flexible.

Moreover, the basic idea of multifunction phones face a chicken-and-egg problem. Though cellphone users now can roam among some networks when they travel, carriers are not exactly eager to let users jump among services in their home market.

"The idea of having a handset that can roam from Cingular to Verizon to Sprint will never happen," said Will Strauss, an analyst at Forward Concepts. "The operators don't want it to happen."

But some companies are betting that new wireless technologies, such as a high-speed cousin of Wi-Fi called WiMAX, will allow new services to enter the wireless market with flexible strategies. Users may one day change networks "multiple times a day, depending on what type or kind of feature or service might be offered by a specific network operator," predicts Vernon Fotheringham, chief executive of Seattle-based Adaptix Inc.

His company sells technology in South Korea to help deliver a new broadband technology called WiBro. Using software upgrades, the same equipment is later expected to work with a mobile version of WiMAX that is being developed.

In the short-term, the software-based approach may offer other benefits to handset makers. Until recently, adding new functions has required them to buy multiple chips or design custom multi-function chips. Besides the time and expense of that approach, the phones they make can't easily be upgraded as new technologies come along.

Fans of software-defined chips also cite performance advantages. Where Texas Instruments and others sell general-purpose chips called digital signal processors for communications chores, the new chips are designed to get high speed by doing specialized cellphone tasks in a parallel fashion. "It's a very very compelling story," says Stan Boland, Icera's chief executive officer.

3Plus1, which is aiming at particularly low cost and power consumption, has developed a chip with specific processors for handling two different kinds of operations common to wireless communications. Sandbridge's chips execute eight strings of instructions once. PicoChip's products, designed for the heavy-duty requirements of cellular base stations, have 300 processors.

There's no shortage of hurdles. Competitors such as Texas Instruments and **Intel Corp.** are betting on advanced "systems on a chip," with fixed circuitry for specific kinds of networks. They also exploring new ways to exploit software, but see limitations; for one things, handset makers will still need multiple transceiver chips to handle different frequencies used by cellular networks.

"What you will find is you can't do the full job in software," argues Bill Krenik, TI's manager of advanced wireless architecture.

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