

January 12, 2002

AirCosm?

I am coming to the conclusion that 2002 could be the year of the Air Interface, the AirCosm. The Fibersphere is quite useless unless the end user can connect to it. What needs to be analyzed are the pros and cons of the various possible last mile solutions and I believe that wireless will be the short term winner.

An optical connection, of course, has the largest bandwidth and no air connection can hope to match it but relatively few end users need that amount of bandwidth anyway. There are tens of thousands of businesses but millions, and potentially billions, of individual end users. Optical last mile solutions are needed mostly by business. Companies like Metromedia Fiber as well as the ILECs and others are bringing fiber to the curb (FTTC) and office buildings are being fibered. Probably the biggest obstacle to fiber past the curb is retrofitting old buildings because of the high cost of labor. I was amazed by the amount of fiber that a MAN requires even if the MAN covers just a very small area. Have a look at Francis Turner's *The Challenges of Metropolitan Networks* in the August 2001 issue of [Rule The World Newsletter](#):

Consider cabling a large apartment complex of 301 apartments in 7 buildings of 4 stories each (a real example that I know of). Just aggregating 301 homes to a single point on the kerb side could result in a requirement to lay kilometers of cable. Within each building there is about 800m to lie and leaving each building will be 43 cables. If the average distance back to the curb side concentrator from each block of flats is 50m, the total amount of wiring required to connect this apartment complex is $800m \times 7 + 301 \times 50m$ which gives a grand total of 20,650m or just over 20 kilometers of cable! This works out at about 70m per subscriber and may help explain why people want to avoid laying new cable whenever possible. Note that even if you install active equipment at the base of each building and thus have only the internal cable runs to worry about you still have to lay about 5.6km of cable and each run has to be individually laid because no two will be quite the same.

WOW! Laying this amount of fiber in new developments is not too bad but

retrofitting old ones is quite a chore. Of course, most people will continue to live and work in the old developments. These miles of cables can be substituted with one or more cell towers at considerably less cost. This cheaper alternatives is welcome even if it underperforms fiber.

Old buildings, at least in developed countries, already sport copper and cable connectivity to the Fibersphere but the available bandwidth is considerably less than that afforded by optical fiber so they are easier to disrupt from below. In Venezuela, for example, we already have fixed wireless connections to the Internet that match DSL access speeds (from a Bell South subsidiary, I believe).

Even businesses that access the Fibersphere through a fiber connection are likely to have air interfaces inside their premises in the form of Bluetooth enabled equipment. Apple Computer has been selling AirPort, a 802.11b based air interface, for several years by now and Wi-Fi based WLANs are becoming quite popular.

Air interfaces, besides having the unique capability of conferring mobility to the user, seems to be a classic case of disruption from below. In the case of retrofitting fiber, it probably has the order of magnitude price advantage and fiber has an overshoot of bandwidth for most end users anyway. With respect to copper and cable, the price and bandwidth of fixed wireless is similar so they will compete on availability and convenience.

Currently there are three major air interface architectures: xCDMA, Bluetooth and Wi-Fi but only one of them, CDMA, is proprietary. The other two are committee ruled protocols. What this means in Gorilla speak is that only CDMA can provide gorilla sized returns. The other two will not produce gorillas. As a matter of fact, Microsoft is doing everything possible to co-opt the Wi-Fi standard into the Windoze standard and I believe they will manage to do so seeing that LAN networking really is part of the computer OS. I believe this will be a repeat of the Novell - NetWare story. I don't know too much about Bluetooth but I believe its main raison d'être is to get rid of the spaghetti of cables surrounding computers and other electronic gadgets. In my opinion, Bluetooth could become an important standard but a niche player. I don't believe it will be competing with Wi-Fi or with CDMA. On the other hand, Wi-Fi seems to be a threat of sorts to CDMA, mostly as a fixed wireless solution.

On the negative side, I believe that the optics sector might not recover as fast as some of us originally expected. The long distance carriers have put a lot of fiber in the ground and under the water and the fiber itself is underutilized at this time. Long distance carriers will be purchasing active and passive optical components to light up their fiber but they won't be buying much new fiber. BTW, the very fact that light can now carry a signal much further without regeneration or amplification means that the market for components might actually be shrinking while bandwidth is growing. This is not the sort of thing that ever happened under Moore's law. The ever shrinking transistor never shrunk its own market, on the contrary, price elasticity more than made up for size and price shrinkage. In the MAN, WAN and LAN markets there is the unexpected competition from air interfaces which will put a damper on the sale of fiber and components. I expect the likes of JDS Uniphase and Avanex to recover more slowly than the overall technology market.

To sum up so far:

- The air interfaces will give fiber a run for the money in last mile solutions and Wi-Fi will compete with CDMA
- In air interfaces only CDMA is a proprietary standard and therefore likely to produce a gorilla but CDMA will get competition from a low cost non proprietary standard, Wi-Fi. Since Wi-Fi is likely to be co-opted by the Windoze standard, CDMA will not be competing only against Wi-Fi but against its adopted parent, Windoze. [Take a ringside seat! :-))]
- Optics might recover more slowly than the overall technology market

How does all this affect our investing strategies? If you are looking for gorillas, Qualcomm seems to be the only one but it is getting attacked from an unexpected sector, not GSM but Wi-Fi/Windoze. If you are looking for kings, then there are several to study. RF Microdevices is totally architecture agnostic since it makes RF devices for all air interface protocols. In the Wi-Fi space, Intersil seems to be a likely king

The big surprise is ARM Holdings. They seem to be inside everything mobile be they cell phones, PDAs or Wi-Fi chips from Intersil.

[Intersil Selects ARM Solutions for Next- Generation PRISM WLAN Products](#)

INTERSIL licenses the ARM946E core for wireless LAN product development -- Use of the ARM MicroPack tool kit and Embedded Trace Macrocell solutions for next-generation PRISM development further strengthens ARM's momentum in networking.

This might be a good time to rotate funds from optics to the AirCosm.

Additional reading:

[Wi- Fi for the masses](#)

[Wireless wrap-up: Carriers moving to 3G alternative in 2002](#)

[CDMA beware of Wi- Fi!](#)

[More that you ever wanted to know about Wi- Fi](#)

I want to thank the people posting at the New Paradigm Investing board on TMF who provided me with lots of very useful information for this essay.

Denny

"Demand creates queues. Supply gets rid of them."

[Software Times](#)