

The Ominous ET Attack?
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Will promise-packed 2002 activate the lurking *killer technologies* that will finally displace the old standbys that have served us for so long? A horde of ETs, or emerging technologies, has been quietly probing the herd of mature technologies and the old barriers. The ETs are gaining potency, even during the slow times – or perhaps because of them. While 2002 may not bring good-byes to old and faithful technologies, it will certainly be a time when newer concepts battle the older principles - a year of technological excitement. Let's look at some of the ET hot spots and speculate on what may happen.

Will the century-old CRT be dislodged by flat screen technology? The cathode ray tube (CRT), once called the Braun Tube, for German inventor K. F. Braun, has been around since about 1897 and it has served us well in many fields. But it's a big, bulky, and heavy energy hog with bad habits. The CRT screen, or faceplate, contains a lot of lead (Pb) that must be used to prevent dangerous x-rays from striking the user. And there is no obvious practical lead replacement in this situation. Flat panel display (FPD) technologies are already on the store shelves in a variety of new monitors, not just in laptops. Although they are not cheap, these monitors seem to be popular. Expect to see FPD products replace desktop computer monitors and TV screens. Finally we can have the long awaited *hang-on-the-wall* TV that becomes the *do-all* communications/entertainment center.

What about mass storage? The magnetic medium has ruled ever since IBM's magnetic rings and the Winchester disk drives became the high-density storage marvels. Magnetic drives have held on by boosting density with breakthroughs like GMR (Giant Magneto Resistance), a fundamentally new principle discovered and developed by IBM. While magnetics may hold its own in the permanent media arena, it is losing its grip in the removable sector. Last year, more optical-based DVD players were sold than magnetic-based VCRs. Expect removable opto-media to take command in computers and entertainment equipment very soon as photonics-based products unfold and evolve. We could speculate that photonics could someday dominate terrestrial communications, but this has already happened. When you surf the web, photonics gives you a million-times bandwidth boost so that web pages load in seconds instead of hours.

What about the *machines of war*? The unfortunate events of the past year have reminded us that defense is very, very important. Expect unmanned vehicles to become the mainstay assault machines in the future, first in the air, then on the ground, and maybe on and under the sea. The communications and control systems that allowed Predators and Global Hawks to fly, see, report and kill, are adequate for now and getting better quickly. MEMS (MicroElectroMechanical Systems) and photonics are key ingredients. Ground radio, satellite links and photonic telemetry are all used. Advancements are occurring at a pace where the US will be able to *bring justice to the enemy* by remote control in this decade. Perhaps Orson Scott Card's "Ender's Game" is the new blueprint where a small

team, or even a single “pilot”, can take on a vast enemy and win using the powerful leverage of high tech.

But surely Silicon Valley is safe from attack by ET, you say. Perhaps not! IBM’s strong thrust into carbon-based nano-transistors could be the *silicon terminator* as we begin to move to quantum devices. Or maybe it will be Bell Labs’ single-layered organic polymer transistors that will bring the earthquake to Silicon Valley. The US government is investing over a half-billion dollars to fund Nanotechnology Centers in 2002 that may help oust *king-of-the-hill* silicon. There is an unimaginable large future for the world’s smallest frontier – Nanotechnology. We don’t even know the boundaries or what the sectors that will be encompassed.

Indeed, this will be an exciting year and an extraordinary decade full of hope. But even the greatest ideas take a long time to mature. And yes, old technologies, at least the good ones, never die; they just find their niches. The nearly 100-year old vacuum tube is still here in powerful radio transmitters and wonderful audio amplifiers that solid-state technology just can’t seem to mimic. And wave soldering continues to thrive with plenty of feed-through components readily available. No, we won’t lose the old favorites anytime soon, but ET is coming and will not be stopped. The technology tapestry will just grow richer, more fascinating and more valuable. So, embrace ET.