

Rugged Tablets for Enterprise

A Realistic Overview

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2011: THE YEAR OF THE FULLY RUGGED TABLET COMPUTER

“The Year of the Tablet” was officially launched at the Consumer Electronics Show in January 2011, when Toshiba, Samsung, HP, Motorola, Dell, Panasonic and many other companies unveiled products they hoped would unseat the Apple iPad as the tablet category leader.

Spurred by Apple’s success in the consumer market, the tablet market has shown explosive growth. Analyst Gene Munster of Piper Jaffray estimates that Apple alone sold roughly 14.5 million iPads in 2010, with another one million sold by competitors. According to Sarah Rotman Epps at Forrester Research, 82 million Americans will be using tablets by 2015.¹

To explain their new-found popularity, tablet enthusiasts point to the ease of use that comes with a large touchscreen display and the now ubiquitous wireless networks that enable tablet users to seamlessly communicate and exchange information both locally and across the Web.

Yet, long before Steve Jobs conceived of the iPad, tablets had achieved secure footing in many industries, including transportation and logistics, field service, and warehouse management. As one of the first companies to introduce a rugged tablet computer in 2002, we at DAP Technologies have a unique perspective on the tablet market. Since the introduction of the DAP Microflex tablet almost a decade ago, we’ve continued to lead the industry in tablet design innovations, most recently with the March 2011 release of our latest rugged tablet, the M9010.

The growing excitement in the consumer tablet market is likely to spike interest among business users seeking to leverage the clear benefits of the tablet form factor. For many industries, however, consumer tablets lack the durability to operate in environments where dust, moisture, chemicals, bright sunlight, extreme temperatures and rough handling are everyday hazards.

In these environments, rugged tablets are the only viable option.

DEFINING RUGGED

Unlike consumer- and commercial-grade products, tablets designed for hazardous or harsh environments must conform to rigorous industry and military standards. Two of the most important are the International Electrotechnical Commission’s Ingress Protection (IP) rating system and the U.S. Department of Defense “Test Method Standard for Environmental Engineering Considerations and Laboratory Tests,” known as MIL-STD-810.

IP Ratings

IP ratings are assigned using a two-digit IP code that indicates the degree to which an enclosure prevents the intrusion of solids and liquids. The first digit indicates the level of protection against the ingress of solid foreign objects, and the second digit indicates protection against the harmful ingress of water. The protection from solids rating ranges from 0 (no protection) to 6 (completely prevents the incursion of dust). The protection from liquids rating ranges from 0 (no protection) to 8 (protected against long periods of immersion under pressure).

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¹ Bye-Bye, PCs and Laptops, The Wall Street Journal, January 7, 2011

According to industry analyst VDC Research Group, only systems that achieve an IP54 rating or better can be considered “fully rugged.” Such systems provide—at minimum—sufficient protection against dust to maintain satisfactory performance. They are also fully insulated from water that splashes against the enclosure from any direction.

The minimum requirement for computers operating in most industrial environments is IP65, which protects against both dust and water. The “6” means it is dust-proof; there is no ingress of dust. And the “5” means water projected by a nozzle against any of the computer’s enclosures from any direction will have no harmful effects.

DAP’s rugged computers have consistently achieved among the highest IP ratings in the industry. The M9010 tablet has attained an impressive IP67, indicating that it completely prevents the ingress of dust and liquid from entering the enclosure when the tablet is fully immersed in up to one meter (39 inches) of water. VDC ranks systems that exceed the IP64 rating—such as DAP’s new tablet—as “ultra-rugged,” the most demanding of all device categories.

The IEC also defines test methods for determining a system’s ability to withstand shocks. The M9010 has been tested to withstand multiple two-meter drops on concrete at temperatures ranging from -30 to +50 °C.

MIL-STD-810 Ratings

Like the IP ratings, the MIL-STD-810 rating developed by the U.S. Department of Defense allows users to predict the performance and service life of a device based on the environmental conditions it will encounter during normal operations. The standard includes an extensive set of test methods for assessing the effects of altitude, extreme temperatures, rain, humidity, sand, dust, shock, vibration and many other conditions. Systems that conform to the MIL-STD-810 ratings are also considered by VDC Research to be fully rugged.

DAP’s M9010 tablet, has been tested and certified to meet the following MIL-STD-810F methods:

Temperature:
<i>Methods 501.4 and 502.4 Procedures I (Storage) & II (Operation):</i> Both tablets demonstrated their “safety, integrity and performance” in both high- and low-temperature conditions.
Free-Fall Drop:
<i>Method 516.5 Procedure IV:</i> Both tablets retained their “functional integrity during transit” by withstanding multiple four-foot drops on plywood.
Immersion, Rain and Humidity:
<i>MIL-STD-810F Method 512.4 Procedure I:</i> Both tablets retained their functional integrity when fully immersed in up to one meter (39”) of water.
<i>MIL-STD-810F Method 506.4 Procedure I:</i> Both tablets retained their functional integrity when exposed to wind-blown rain.
Vibration:
<i>Method 514.5, Procedure I (general vibration), Category 20 (terrestrial vehicle):</i> Both tablets retained their functional integrity when exposed to the random broadband vibrations typically encountered in wheeled and track-laying vehicles.
<i>Method 514.5, Procedure I (general vibration), Category 24:</i> Both tablets retained their functional integrity when exposed to the transportation and handling conditions typically encountered during field installation, removal and repair.

The MIL-STD-810 rating developed by the U.S. Department of Defense allows users to predict the performance and service life of a device based on the environmental conditions it will encounter during normal operations.

DAP tablets have been tested and proved to continue working after repeated drops onto concrete and plywood, as well as exposure to intense vibration, extreme temperatures, immersion in water and wind-blown rain.

The M9010 tablet features an optically enhanced, rugged touchscreen that resists direct impacts, chemical spills, scratches and other challenging conditions encountered in both indoor and outdoor applications.

RUGGED TABLET MARKET DRIVERS

While trends in consumer electronics are often a precursor to those in business, recent legislative initiatives and ongoing business challenges offer additional motivation for companies to consider integrating tablets into their mobile workforce solutions.

Transportation and Logistics

The trucking industry is reeling from a host of regulatory initiatives introduced by the U.S. Department of Transportation's Federal Motor Carrier Safety Administration (FMCSA) in recent months to address environmental and safety concerns. Chief among these is the requirement to deploy Electronic On-Board Recorders (EOBRs) in semi-truck cabs to replace and automate the current manual process, which requires drivers to track their hours of service using hand-written paper logs. The rule was originally proposed in January 2007 and formally published in April 2010. It took effect on June 4, 2010 and requires compliance by mobile carriers beginning June 4, 2012.

An EOBR digitally records information about the identity of the driver, as well as the date and time, distance traveled, and location of the vehicle. This data allows law enforcement and weigh-station personnel to accurately determine whether trucking operators are compliant with the FMCSA's hours of service (HOS) rules for commercial vehicles designed to reduce accidents caused by driver fatigue. The information is also used by the FMCSA to gauge whether drivers involved in an accident were at fault because they were excessively fatigued or driving inattentively.

In its current version, the new requirement will primarily impact the estimated 10% of commercial trucking firms that are classified by the FMCSA as having repeatedly violated its HOS guidelines. Eventually, however, the regulation is expected to affect more than 6,000 fleet operators and four million truck carriers and independent drivers.

Of course, the need to incorporate computer systems into commercial vehicles is hardly a new development. Most companies have long deployed fixed-mount GPS-based systems that enable dispatchers to communicate with truck drivers and plan their routes while providing drivers with the means to navigate and avoid traffic. Analyst group ABI Research² projects a bright future for these fleet management systems and a compound annual growth rate of 30% or more.

Many fleet operators have also incorporated "black box" vehicle tracking systems that automatically collect and transmit real-time operational data such as speed, engine RPM, fuel consumption, odometer readings, engine temperatures and tire pressure, enabling operators to ensure trucks are being properly maintained and safely operated. Black boxes can also be used to automate fuel-tax calculations and reduce fuel costs, which began to skyrocket in 2007-2008, threatening profits and putting-

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2 Real-Time Fleet and Cargo Dispatch Markets White Paper from ABI Research

some operators out of business. Most fleets also equip their drivers with handheld scanners and other portable systems for printing invoices, collecting signatures, scanning shipments, managing manifests, etc.

FMCSA requirements, however, are likely to be a tipping point for the industry, especially for the hundreds of operators assigned at the outset to carry the new EOBR devices. Faced with the prospect of buying and integrating yet another system, operators will seek ways to save costs and improve efficiency by consolidating their discrete devices into one unified, multi-function platform.

Fully rugged tablets offer fleet operators an advantage over other devices because they offer the flexibility, communications capabilities, screen size, mobility and processing power to replace multiple discrete systems with a single tablet. In addition to providing compliance with EOBR, a tablet from DAP can be customized to perform GPS routing and related functionality, black box tracking, fuel optimization, inventory, scanning, invoices, manifest management, signature collection, communications and more. Tablets also transition effortlessly from the cab to the loading dock and anywhere else they need to go, giving them a mobile advantage over traditional fixed-mount systems.



A single DAP tablet replaces multiple systems by gathering and relaying real-time location and telemetry data to database servers via a Wireless Wide Area Network (WWAN).

Combining the functionality of several systems into a single tablet saves an estimated 30-35% in hard costs alone. These savings come from the reduced costs of purchasing only one device requiring a single data plan. The tablet model also simplifies maintenance and upgrades of hardware and software.

Because DAP's modular design strategy allows operators to selectively incorporate new communications, including proprietary radios and necessary data-collection technologies, without replacing the entire tablet, they can also expect significant reductions in downstream soft costs.

Field Service

With a fleet of vehicles to manage and mobile workers to track, the field service industry has many of the same requirements as the trucking industry, with some notable differences.

Unlike drivers, for example, repair technicians typically devote the majority of their system time to viewing schematics and looking up repair instructions. These tasks are performed much more efficiently on a tablet than on a handheld with a small screen or a cumbersome laptop computer with a screen that's vulnerable to breaks and requires time to "wake up" each time the screen is opened.

Field service technicians frequently must work outside in direct sunlight, where laptop displays become difficult—if not impossible—to see because of glare and reflections. DAP's tablets feature optically enhanced touchscreens that utilize ambient light to significantly enhance viewability, producing clear and sharp images in even the most sun-drenched conditions.

When weather conditions deteriorate, field service workers often must contend with extreme temperatures, wind-blown rain, ice deposits and other conditions that consumer-grade computer systems were never designed to withstand. When rough handling is the rule, rather than the exception, only fully rugged tablets like DAP's M9010 can provide the flexibility, functionality and low total cost of ownership required by the field-service industry.

Warehouse Operators

Most warehouses and distribution centers operate 16-24 hours a day, especially during holidays and other peak seasons. However, not all the equipment used to select goods and track inventory are fully utilized throughout the workday.

Forklifts, for example, typically see their greatest use in the mornings, when outgoing trucks are loaded with product, and again in the evenings, when goods arrive to be moved into inventory. Fixed-mount computers are commonly used on forklifts because they offer a generous screen size. A disadvantage of a fixed-mount computer, however, is that when the forklift lies dormant, it cannot be utilized elsewhere, requiring companies to purchase supplementary portable systems to make up for the utilization shortfall. When forklift use is concentrated during certain times of the day, warehouses can deploy tablets that subsequently can be used by mobile workers during shipping and receiving, as well as by managers performing audits or checking inventory.



With a DAP tablet mounted on a forklift, operators can seamlessly roam between access points, giving them freedom to move throughout the entire warehouse without losing wireless connectivity.

When a forklift operates 24/7—or a system is being utilized as a wall-mounted cross-dock transaction station—a fixed-mount system sometimes appears to be the obvious choice. Mounted low-profile tablet solutions, however, should also be considered for forklifts because they provide a large screen size without obstructing the operator's sightline and offer grab-and-go convenience. With a quick-release vehicle mount, operators can remove the tablet and use it as a handheld scanner on the floor, making it a superior to a fixed-mount computer for data entry and picking functions.

On the warehouse floor, efficiency can be measured by the time it takes to accurately pick an item using a handheld computer equipped with a keypad, a wireless con-

nection, and a barcode or RFID reader. Every second spent rekeying a transaction or correcting a pick error adds to the costs of order processing, significantly eroding the bottom line.

Recognizing this, software companies are increasingly deploying interfaces for warehouse managers and workers that replace keystrokes with touch screen controls and dropdown menus. A customized interface presents users with only the most relevant touchscreen controls, improving order processing efficiency and accuracy, while reducing the time needed to learn and master key-based systems.

While excellent for scanning and data-entry applications, smaller handheld devices lack the screen size to fully display these new interfaces, requiring users to navigate through pages of menu items or view only one or two pick instructions at a time.

DAP's tablet computers can bridge the functionality gap between handhelds and the large-screen, fixed-mount systems typically found on forklifts and trucks by providing mobility and a larger screen size in a single computer.

FLEXIBILITY OF THE TABLET FORM FACTOR: ADVANTAGES FOR THE BOTTOM LINE

While there are numerous compelling reasons for businesses in various industries to feature tablet computers in their operations, the deciding factor for any technology purchase is usually financial. In the case of the tablet, its flexibility is the key to maximizing financial gains.

Business requirements are in continual flux, reacting to both the market and internal goals and pressure. Meanwhile, the quickening pace of technology means computer equipment purchased as few as five years ago may no longer be supported. These factors underscore the need for flexibility in computer equipment.

Deployment Versatility

DAP tablets combine the benefits of a large display screen with mobility, portability and convenience. Because tablets are so versatile and can be used in place of fixed-mount, clamshell laptop and handheld computers, a company can reduce the number of devices it has to support by deploying tablets. That results in both a reduction in the hard costs associated with the initial costs of deployment (including the hardware, accessories, software, implementation and training) and the soft costs associated with maintaining the systems during operations (including allocations for IT support, repairs, replacement parts, loss of productivity and loss of opportunity). As an additional advantage, if a device should go down, it takes minimal time and effort for an employee to grab a replacement unit and return to the task at hand.

Display

In most industrial environments, companies employ mostly fixed-mount or handheld computers. Fixed- or machine-mounted computers offer the advantage of a larger screen size, but can only be used while connected to heavy machinery. Handhelds, on the other hand, trade screen size for mobility and convenience. Tablets combine the best of the two form factors by offering a larger screen size in a compact computer that can be picked up and used throughout a facility and in the field.

The screens on DAP's tablets are a full wide video graphics array (WVGA) resolution of 800 × 480. Most handhelds offer only a quarter VGA, meaning the screen is limited to displaying one fourth the information displayed on a tablet. That may translate,

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for example, to a handheld display that shows just one pick order in a warehouse environment or one service order in field service at a time. The rest of the information must be accessed by scrolling. That may seem like a relatively small impact, but time spent scrolling and searching for information adds up over the course of a shift and may be hindering efficiency.

Modularity

A major drawback for purchasing new technology, both in the industrial and consumer realms, has always been the relatively static nature of computers. They are often built with a one-size-fits-most approach in which customers end up paying for options they don't need. And even if customization is available at the point of purchase, technology can be outdated in short order, leaving the buyer with obsolete technology to use until the next major purchase starts the cycle anew.

With the modularity of DAP's tablets, users have the opportunity to:

- **Specify their requirements at the time of purchase**—Customers can choose the operating system, keypad or touchscreen, memory, data capture and expansion slots to meet their needs, without being burdened by a host of superfluous extras that drive up the cost.
- **Add their own circuitry to the product**—DAP's tablets are uniquely engineered to provide customers with advanced customization needs, including the ability to add their own circuitry to the computer. For example, a customer who needs sophisticated environmental measurement tools can add their own circuitry to accommodate a range of tools, including specialty microphones, proprietary radios, etc.
- **Adapt to meet emerging requirements**—Because DAP's computers are modular in design, customers have the opportunity to “future-proof” their tablet computers against changing technology. If, for example, a new wireless technology becomes available, the modular component can be quickly and cost-effectively replaced without purchasing a new system. Or, if modules like RFID or biometrics readers aren't needed at the time of purchase, they can be easily added in the future. Businesses can leverage these same modular capabilities to upgrade their systems to support new technologies for scanning, wireless communications and more. This modular upgradability extends the life of the tablet, which due to its rugged design, is built to outlast most computers.
- **Service units faster**—Modularity also benefits users if repairs are needed because DAP tablets can often be returned to service quickly by replacing the modular component rather than the entire system.

While the financial implications of technical upgrades are a reality, the organizational efficiencies realized as a result can help offset equipment costs and have lasting effects on the overall business.

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CHOOSING A TABLET

There are many factors to consider when determining whether a tablet is the right choice in a specific environment and application. Following are some questions to consider.

General Questions

When is the tablet the right form factor?

Tablets are the best fit when there is a need to support multiple types of users and applications with a portable device that incorporates a large display and a customized user interface.

What should companies look for when evaluating a tablet purchase?

Knowing where and how the computer will be used is the first consideration. Technological considerations—including the available operating systems, compatibility with any legacy devices and software, memory, processing speeds, wireless communications and the customizability of the computer—are obviously important. Then environmental factors—including temperature ranges, lighting conditions, the levels of moisture and dust, vehicle vibrations, and probability of drops and mishandling—should be addressed. Finally, all computer hardware should be purchased with an eye toward the future. Understanding how the device can be upgraded and the cost of replacing and upgrading scanners, data input devices, communications technology, and other components factors into the total cost of ownership and are at least as important as the initial cost of the computer.

Environmental considerations

Will the device be used in varying light conditions?

If so, buyers should look for displays that utilize ambient light to optimize viewability in a range of conditions including bright sunlight.

Will the system be used for a full shift?

Buyers should select systems that provide the necessary battery life and the capability to hot-swap a second battery without powering down the unit. DAP's innovative M9010 tablet meets both of these requirements.

Does the tablet manufacturer also supply handheld and fixed-mount systems?

One type of computer may not be right for all the applications within company. DAP offers a comprehensive line of handheld and fixed-mount devices that address virtually every rugged form factor and application requirement

Do I need a fully rugged tablet?

Companies should carefully consider the challenges posed by the work environment and the likelihood of rough handling. When a fully rugged tablet is indicated, buyers can use VDC's recommendations as a guide, selecting tablets that achieve an IP rating of at least IP54 (higher is better) and that conform to

all of the applicable performance benchmarks defined by the MIL-STD-810 test methods.

Total cost of ownership

Can the tablet meet both current and future scanning and communications requirements? How easily can it be upgraded? In short, how flexible is the platform?

Most companies address current needs with their technology purchases; but companies looking to lower the total cost of ownership of a device should also anticipate their future needs. All DAP products employ a modular design philosophy that simplifies upgrades and retrofits and makes them cost-effective. If, for example, new scanning technology is required or a new communications protocol introduced, the components can be upgraded or added, as needed.

Does the manufacturer support a broad range of operating systems?

DAP's current lineup supports Linux and all of Microsoft's current mobile operating platforms, including Windows CE, Windows XP Professional, Windows Embedded Standard and Windows 7.

Does the manufacturer's product roadmap include support for new operating systems?

The excitement surrounding the latest release of the Android operating system demonstrates the importance of selecting devices that fully leverage the potential and promise of new operating systems and new classes of mobile devices. At DAP, this market insight is one of the central tenets of our design philosophy.

Ergonomics

Is the tablet comfortable to hold? Are the controls correctly placed? Would you enjoy using it throughout the workday?

All DAP products undergo extensive ergonomic testing and are designed so that controls, grips and displays are correctly positioned to minimize user fatigue and errors. When held, DAP products feel balanced and secure, which is essential for systems that undergo rigorous use and rough handling throughout the workday.

CONCLUSION

As tablet computers continue to gain momentum and acceptance into a variety of industries, 2011 may, indeed, be the year of the fully rugged tablet computer. As operations in traditionally rugged environments like transportation and logistics, field service, and warehouse operations begin to realize the productivity and financial benefits of fully rugged tablet computers, this is surely only the beginning of this trend. The key for IT managers and buyers to securing the maximum value of their technology investment will be choosing products that provide the ruggedness, portability, flexibility and modular functionality to meet the specific needs of their operations now and into the future.

ABOUT DAP TECHNOLOGIES

DAP Technologies has offices in Tempe, Ariz.; Quebec City; and Abingdon, U.K., and designs and manufactures a full range of rugged computers, including PDAs, handhelds, tablets and fixed-mount computers for demanding industries and harsh environments. DAP's mobile and fixed-mount computers improve data collection, processing and transmission in numerous industries, including utilities, field service, identity management, transportation and logistics. DAP Technologies recently consolidated the Duros and DAP product lines under the DAP brand.

To learn more, please visit DAP Technologies at www.daptech.com or contact your nearest DAP office location.

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