



RUGGED VS. COMMERCIAL

Considering the Total Cost of Ownership Of Handheld Devices

RUGGED VS. COMMERCIAL: CONSIDERING THE TOTAL COST OF OWNERSHIP OF HANDHELD DEVICES

Executive Summary

In order to objectively assess the business case for deploying handheld devices, it is critical that the organization understands the ramifications of their choice of device. As with any buying decision, consumers perform a cost benefit analysis, weighing options versus the benefits relative to the initial cost of the unit. Cost should be measured over its expected lifespan from purchase to disposal rather than a point in time. Over time, device performance can seriously affect the overall performance of the business and the return on investment (ROI).

Today's organizations are continually changing and adapting, as the ability to give workers more freedom. Decisions are being made at the point of interaction as there is a higher demand within the wireless communication solutions. As the use of smart phones proliferates within enterprise and commercial environments, organizations are looking to port more line-of-business applications to these devices and expand their functionality. Although smart phones are mostly deployed for white-collar professionals, they are increasingly being considered for gray/blue-collar worker applications.

In the model created for this paper, rugged devices are found to be significantly less expensive (approximately 32%) from a Total Cost of Ownership (TCO) perspective that encompasses 5 years. This finding is backed up by Venture Development Corporation's (VDC) findings in their 2003 and 2007 Total Cost of Ownership models that surveyed a broad range of actual deployments. VDC reports total cost of ownership annual savings of up to 17% in Field Profession applications and up to 32% in Supply Chain applications for rugged hardware deployments.

Rugged vs. Commercial Handheld Devices

Manufacturing organizations use mobile computers for a wide variety of applications such as material management, supply chain, quality control, asset tracking, and ad hoc communications. However, this sector has some uncertainty and confusion surrounding which mobile computers and applications are most appropriate.

Of the numerous decisions and options, a great debate surrounds the question of whether to integrate industrial grade rugged equipment or to use commercially available non-rugged devices. This question has proven to be complex for organizations to answer as they attempt to balance the cost of projects and mitigate their impact on budgets, while selecting device features most appropriate for their application. Since budgets are key influencers in the decision making process, price is a major concern.

This document will examine the TCO of rugged and non-rugged handheld hardware in enterprise applications and reveal the myth that commercial non-rugged handheld hardware is more cost effective with a better ROI. When examining the opportunity cost of hardware failure and resulting downtime to the enterprise, the total cost of ownership becomes clear.

"VDC's end user research confirms that more rugged premium priced products are viewed as money well spent."

Venture Development Corporation (VDC) Report: THE GLOBAL MARKETS FOR RUGGED MOBILE COMPUTERS, APPLICATIONS SOFTWARE AND SYSTEMS INTEGRATION SERVICES



UNDERSTANDING THE KEY METRICS USED TO MEASURE HANDHELD HARDWARE

In order to evaluate handheld hardware, it is important to understand some key metrics used to benchmark them. These services entail scheduling optimization and dispatch solutions, business intelligence and analytics, service parts planning systems, Geospatial Information Systems (GIS) systems and Global Positioning Systems (GPS). These computing solutions serve as an integral part of a full technology suite, enabling technicians and field managers to access real-time data, communicate with the home office and peers, perform analysis, and make decisions on-site in the field.

For the purpose of making a direct comparison, the commercial non-rugged units used in this paper are made semi-rugged using aftermarket ruggedized accessories in order to mirror the feature set of the rugged units. In support of this comparison methodology, a TCO report published in December 2003 by VDC cites 100% of respondents having deployed commercial devices add at least one external or integrated module to enhance the device. The report states that over 59% add one module, 28.1% add two, and 9.4% add three and the remaining add four. Modules may include RF radios or barcode scanners.

Rugged Specifications

To measure the ruggedness of handheld hardware, standard tests, performance criteria and rating systems have been developed. These tests are designed to mimic some of the environmental strains to which hardware might be exposed during deployment. VDC estimates testing device ruggedness to be as much as \$100,000.00 per design. It is unlikely that such testing would be done for products that are not required nor expected to support claims of ruggedness. Commercial devices are designed for use in a non-rugged office environment where rugged features are not important considerations for consumers. Interestingly, enterprise consumers, including commercial device users, cite ruggedness and durability as the number one product feature deemed critical to operational efficiency. If commercial devices are deployed outside of their intended application, the lack of rugged features can seriously shorten their lifespan, adding to the total cost of ownership.

In research done by VDC, the most common reasons cited for choosing rugged handheld devices over commercial handhelds were:

1. Ruggedness/Environment is too harsh for commercial grade
2. Sustainable increase to productivity
3. Lasts longer - Lower TCO

The following is a summary of the tests used to determine the ruggedness of handheld devices.

Drop Rating

Ruggedized models can absorb impact from drops, metal construction and other features to provide protection. The drop rating is a measure of a devices ability to survive repeated falls from a specified height onto a designated surface in full working function. In rugged device testing, the surface is concrete while the height can vary. The higher the survivable drop height, the more rugged the device. A drop height of 4-5 feet to concrete is considered a reasonable test of ruggedness.

From the Field

A company that provides residential and commercial water service uses handheld devices for their field service technicians who read, repair and change water meters. Originally, the company deployed a popular commercial device to improve the productivity; however, they were unhappy with the ruggedness of the device. The device failures prevented meeting their efficiency goals. Even after deploying ruggedized sleeves the drop rating did not improve sufficiently. Eventually the company upgraded to a rugged handheld and effectively eliminated the device drop issue.

IP Rating

An Ingress Protection Rating (IP rating) is a standard used to identify to what degree a device can withstand exposure to solid particles and liquid ingress. Typically, an IP rating is expressed in 2 numbers - such as IP65. The first number indicates the protection against solid objects or dust, where the maximum rating is "6". A "6" indicates that the device is impervious to any ingress of dust. The second number indicates the protection against liquids, where the maximum rating is "8". An "8" would indicate that the device can withstand continuous immersion in water. A device with a high IP rating would be an important consideration for use in outdoor applications.

The required IP rating will vary by application; commercial device manufacturers rarely specify an IP rating. Commercial devices are not designed with excessive dust and liquid exposure considerations, they rely on after-market accessories to provide limited ingress protection which may or may not provide consistent protection during device operation.

Operating Temperature

Commercial devices are typically designed to operate in a "normal" environment where the temperature is fairly constant such as an office. Using a device outside of its specified operating temperature range may lead to premature failure. Industrial devices are designed to work over wide temperature ranges that often include conditions well below freezing.

From the Field

In order to use a commercial handheld in the cold Canadian winter, users have had to create inventive ways to overcome the limitations of commercial devices to operate in the cold. In one example, to keep the display screen warm enough to read, custom cradles were built with heating pads that warmed the screen when it was docked in the cradle. This "work around" increases the TCO of the solution by adding a second point of failure (the cradle) that could cause the device to fail, not to mention the cost of the cradle itself.



THE BUSINESS CASE

In order to develop a business case for purchasing rugged mobile devices versus non-rugged equipment, it is necessary to analyze how these benchmarks will affect the ability of the business to operate at the desired level of productivity. The cost of downtime can be estimated by extrapolating the numbers compiled to calculate potential productivity gains to predict potential costs from device failures to various areas of the business.

Opportunity Cost and Warranty

The biggest single ROI killer is downtime. Downtime is defined as anytime that a device is not functioning at operational capacity thereby affecting the user's ability to complete their work. Organizations underestimate the cost of lost productivity from downtime. According to VDC, the expected failure rate of commercial handhelds compared to rugged devices can be as high as 4 to 1. In their 2003 TCO study, VDC found that downtime for mobile workers using commercial devices can be as much as 48% higher than for rugged device users.

Inappropriate deployment can easily raise the failure rate of a mobile device. The three leading sources of failure are cracked displays, damaged hard drives and peripherals. These can be easily influenced by exposure to extreme temperature fluctuations, water/moisture/humidity, excessive vibration or dropping, and, in certain cases, EMI (electromagnetic interference).

Solutions

- Integrated peripherals and I/O capabilities can be used to reduce or eliminate peripherals and lessen the chance of failure.
- Devices can also be sealed to protect the hard drive and other internal components from exposure to liquids, dust and other potential hazards.
- Ruggedized models can absorb impact from drops, metal construction and other features to provide protection.

Direct and Indirect Effect

In the event of a device failure, multiple areas of the organization will be indirectly affected: the user, their supervisor, IT resources responsible for managing the devices and software, administration who must ship the device for repair, customer service who receives an increased call volume regarding missed service, the scheduling department who must reschedule the missed business, operations who must reallocate resources to cover the missed work, etc. These are common examples of how deep a device failure can reach into the business. VDC found that IT support requirements can be as much as 44% higher for commercial device deployments than rugged ones.

Information such as wage rates, daily revenue by mobile worker, total down-time in man-hours to manage a failure, the cost of down-time to customer service, sales, brand equity, etc, are all numbers that are unique by company. In this case, assumptions were made to create an example of the beginnings of a TCO.

In this case, the commercial device is the more costly device to maintain over a 5 year term. The TCO model of the commercial device continues to trend even higher when more detail is added to the business case to include more opportunity cost assumptions of device downtime. In VDC's TCO models, IT support costs and mobile user downtime costs are clearly illustrated in the model. In each case the total cost of ownership was higher for commercial device deployments. The end results net annual savings of up to a 17% cost of ownership in Field Profession applications and up to a 32% lower annual cost of ownership in Supply Chain applications for rugged hardware deployments.



THE DECIDING FACTOR

This whitepaper is intended to demonstrate that there is a higher cost of ownership when using commercial handheld devices rather than rugged devices in industrial applications. In this demonstration the additional cost of adding features and improving the ruggedness of the device eliminates any price advantages of commercial grade handhelds. According to VDC's report on Total Cost of Ownership, higher ruggedness provide significantly less lost productivity, lower device failure rates and wireless transmission failures, and a significantly higher percentage of maintenance covered by warranty. A key to selecting the most appropriate type of device is having a clear expectation of how long the device will be in service.

White Paper Rugged Handheld Total Cost of Ownership

Sources:

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