Sacramento, August 14, 2012 — This is an initial hands-on look at the next generation of Motion’s F5 tablet computers, now named F5t, which Motion calls a “rugged, highly mobile, field tool for point-of-service computing.” The F5t is a companion version of Motion’s milestone C5 Mobile Clinical Assistant, a tablet that was created based on Intel’s clinical computing platform reference design. Both have now been upgraded to 3rd generation Intel Core processors and ancillary technology, with major improvements, among other things, to performance and battery life.

Motion first unveiled this slender 10.4-inch tablet a full three years before the iPad, at a time when tablets were still considered niche market solutions for certain specific and specialized applications. Back then, no one could have dreamed of the runaway success of consumer media tablets.

The C5 was originally conceived for healthcare staff that would benefit from a lightweight design with a barcode scanner built right into the handle to make the device easy to carry, with RFID for data capture, and a pen for signatures, mark-ups, and drawing. It quickly became obvious that the handheld tablet was equally suitable for work outdoors. In this report we’re examining and discussing the vastly more powerful next generation F5t version of the product, how it compares to earlier generations, and how it fits into the tablet future.

One thing that has set Motion apart ever since the company entered the tablet market in 2002 is their drive to quickly make available to their customers the latest technological developments. Motion users never had to wait long for the newest processors and display technologies, and Motion never cut corners or compromised. When a lot of the competition jumped on the Intel Atom platform, Motion stuck with more powerful (and more expensive) Core processors, and sprung for the best display technology (Hydis ASSF+) with virtually unbreakable Corning Gorilla glass displays.

So what does the latest version of the Motion F5 offer? First and foremost a migration to Intel’s recently introduced 3rd generation Core processors that bring lower power draw, more speed and much better graphics performance, all qualities highly desirable in a lightweight tablet computer. Second, a number of additional and ancillary technology and functionality enhancements such as a combination of capacitive two-finger touch and high-resolution digitizer pen, new GPS and WWAN options, and higher capacity SSD storage.

Combined with native USB 3.0 and PCIe 3.0 support, systems can process much higher data loads and provide quicker, richer and more complex visuals (if a system has all the necessary ports, on up to three simultaneous displays). What’s the deal with USB 3.0 and PCIe 3.0? Well, with a maximum transmission speed of up to 5 Gbit/s USB 3.0 — which is backward compatible with USB 2.0 — is more than 10 times as fast as USB 2.0, reducing data transfer time and power consumption.

But there’s more: The mobile versions of the 3rd Gen Core processors that Motion uses in the new F5t support DDR3L memory that operates at a default voltage of 1.35V as opposed to the standard DDR3 1.5V. This means additional power savings.

And Intel didn’t only switch from 32 to 22 nm processing technology, they are now also using Tri-gate transistors that take transistor design from 2D into 3D. They have conducting channels on three sides of a vertical fin (or even multiple fins) as opposed to the single surface of a planar transistor, providing a much larger surface area for electrons to travel and making for less leakage and quicker switching, all contributing to lower power consumption at the same performance (or more performance at the same consumption).

How does all of this apply to Motion and the new F5t tablet? It means a huge jump in performance. For a bit of history, in terms of processing power, the original F5 tablet began with lowly 1.2GHz Intel Core Solo U1400 single core processors. That chip was then replaced by the Intel Core 2 Solo U2200 that ran at the same 1.2GHz clock speed, offering incrementally better performance. Back then, a lot of the competition began experimenting with Atom processors that cost less, but offered only modest performance. Motion rejected that path for the C/F platforms and switched to the more powerful Core 2 Duo U7500 processor, resulting in a substantial power boost at just a slight reduction in battery life.

**Intel 3rd Generation Core i7 power**
It seems like only yesterday that Intel introduced the first and then second generation of Core processors. Now the third generation is here, and it’s a big step forward. In short, this latest and most advanced processor family from Intel includes CPUs with a new 22nm (down from 32nm) manufacturing process, a much more powerful graphics processor integrated into the CPUs, a chipset family that supports Intel HD graphics, as well as new Gigabit Ethernet and new WiFi chips. Compared to the 2nd generation predecessor family, equivalent 3rd generation Intel Core processors deliver up to 15% more CPU performance, up to 60% more 3D graphics performance (which has always been a bit of a weak point in Intel integrated graphics), and up to 1.8x transcode speed via Quick Sync Video. There is also support for Microsoft DirectX 11, OpenGL 3.1 and, new, OpenCL 1.1.
Just a year later, Motion switched to an Intel Core i7 640UM processor. That CPU ran at 1.2GHz but could reach as much as 2.26GHz when Turbo Boost kicks in, more than doubling the tablet’s overall performance compared to its predecessor. And now, Motion is among the first to offer 3rd generation “Ivy Bridge” processor technology by making available either the 2.00GHz (3.2GHz with Turbo Boost) Core i7 3667U or the 1.7GHz (2.6GHz with Turbo Boost) Core i5 3317U. So how fast is the new F5 with the 3rd gen i7 chip? Speed in computers is relative. Operating systems and systems configurations can have a greater impact on perceived performance than processors. But benchmarks are still a good way to test performance. So we ran Passmark Software’s Performance Test 6.1 on the F5 to objectively measure performance. Passmark’s benchmark suite runs about 30 tests covering CPU, 2D graphics, 3D graphics, memory, and disk and then computes scores for each category and an overall Passmark score. No two benchmarks are alike, and so we also tested with CrystalMark. And for comparison, we’re showing the numbers of the first, second and third gen F5 models to show their relative performance levels. The results are shown in the table above.

Benchmark testing is often inconclusive, especially when comparing dissimilar systems architectures and storage types. This time, however, the results are loud and very clear: The new Motion F5t with its third gen Core chip is much faster than the predecessor model. There are major improvements in virtually every test area. Processing, memory and graphics tested much faster. Disk performance is also improved (though not by as much as we expected given the availability of USB 3.0 and PCIe 3.0).

Overall, in RuggedPCReview’s benchmark testing, the new Motion F5t has roughly twice the performance compared to the F5v model it replaces, and about six times compared to the original Core Solo version. Graphics performance has doubled as well, and more than quadrupled for those who need OGL.

PassMark 1,238.9 564.9 251.3 194.4
ALU 47,432 23,147 8,141 4,565
CPU 43,050 23,596 8,080 5,434
MEM 43,197 6,552 6,222 4,989
HDD 27,527 24,780 15,444 3,252
GDI 14,308 6,978 1,388 4,239
D2D 2,558 1,492 1,542 4,221
OGL 7,581 1,617 861 1,151
CrystalMark 185,653 98,162 41,678 27,760

Performance, yet battery life can be twice as long.

As with any benchmark results, of course, real world mileage varies. What is indisputable is that the Ivy Bridge platform has exceptional power management, and this directly benefits the F5t tablet.

Overall, these benchmarks confirm what we believe happens with every new machine we get from Motion: it is much faster than the one it replaces. In the past, it was extra performance at no penalty in battery life. With the F5t it is a lot of extra performance and potentially up to twice the battery life.

Here a few extra data points: While the machine sleeps in stand-by mode, it used about 2.5 watts, so that would mean about 18 hours of stand-by time. If the screen brightness is all the way to maximum in Power Saver mode, minimum power draw increases to 8.5 watts, still good for about 5.5 hours. "High Performance" mode boosts idle draw to 10.3 watts, good for about 4.25 hours. And really pushing the machine with running 1080p video showed about 12.8 watts, still good for 3.4 hours.

**Superior display technology**

Superior display technology now combines View Anywhere and Corning Gorilla Glass technologies.

Motion tends to adopt new technologies very quickly, and that includes displays. We’ve long felt that Hydis AFPS+ (Advanced Fringe Field Switching) displays are among the very best, and this type of display is a standard feature in the F5t. Hydis AFST technology offers a full 180-degree viewing angle from all directions and there are none of the annoying color shifts and variations in luminance you often still see in conventional LCDs. AFPS+ adds reflective areas to what is essentially a transmissive design, and adds special polarizers and cell design optimized to reduce surface reflectance. As a result, AFPS+ screens are bright and vibrant indoors while being amazingly vibrant and readable outdoors, combining the best of both worlds better than any of the older transfective displays can.

Motion also blazed the trail in another display-related area: In 2009, the company was pretty much the first to use Corning’s “Gorilla glass.” Somewhat oddly named, Gorilla glass is a unique thin-sheet glass that uses a special chemical ion-exchange strengthening process to create a “compression layer” on the surface of the glass designed to protect against display damage. The primary purpose of that layer is to act as an armor that guards against the nicks and tiny cracks that then result in the glass breaking. And even if there are tiny nicks, the layer keeps them from propagating.

Examine the video on Corning’s Gorilla Glass page, and you see the glass being bent and steel balls falling onto it. The glass neither shatters nor breaks. In fact, it’s hard to believe it’s glass at all. It looks more like a very thin sheet of some polycarbonate plastic or acrylic. But it is glass. And lots of other mobile computing companies are using it now.

What’s new with the F5t is that Gorilla Glass is now available in conjunction with the handy Dual-Touch display that combines capacitive touch with a Wacom-style pen as well as Motion’s proprietary View Anywhere optical display enhancements. Before, you couldn’t get Gorilla Glass and View Anywhere together. One potential issue: the capacitive technology used on the F5t currently only

**Power Efficiency**

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past, they remain somewhat readable.

**Other changes and improvements**

The big news with the Motion F5t is the switch to the Intel 3rd generation Core processor platform that provide more speed, much better graphics performance, potentially much higher throughput, and significantly more efficient operation. But Motion also took the opportunity to improve the F5 platform in a few other areas:

- WWAN and GPS are unbundled, so instead of Gobi 2000 with GPS, the F5t can be ordered with an optional MC8355 HSPA/CDMA Gobi PCI Express Mini Card module and/or an optional GPS module with WAAS (Wide Area Augmentation System), EGNSO (Euro Geostationary Navigation Overlay Service) and MSAS (Multi-purpose Satellite Augmentation System) for accuracy and faster satellite acquisition time.

- The USB port supports USB 2.0 and 3.0.

- The new Intel Centrino Advanced-N 6235 dual band Wi-Fi module also includes Bluetooth 4.0.

- There is now a front-facing web camera, presumably for video conferencing (note that both cameras are optional).

- RAM is now faster 800MHz DDR3 instead of the older model’s DDR2. Standard RAM is 1GB and maximum RAM is 4GB.

- RAM is now twice as fast and more efficient; instead of standard 800MHz DDR3, the new model gets 1.600MHz DDR3L memory, and the base configuration includes 2GB instead of 1GB.

- The 1.8-inch SATA hard disks have now been fully replaced with 64GB or 128GB mSATA solid state drives that are quicker, more reliable, and less prone to damage (our unit had the standard 64GB SSD).

- Capacitive touch and pen input. As stated, the only potential issue is that it only supports two fingers. Two fingers is all you need for zooming and rotating, but some gestures may require more.

**Using the Motion F5t**

Unlike earlier F5 tablets, this latest one combines an active digitizer with a touch screen. Tens of millions of people are now familiar with touch and they expect touch from a tablet. The F5t offers that, and it’ll shine with Windows 8 when it comes along. A good number of those millions would probably love the added precision of a pen, and the F5t has that, too. So in that respect it’s the best of both worlds.

In earlier reviews of this platform we commented supports two fingers.

Since the iPad set the standard for tablets, we did some outdoor comparison pictures of the F5t side-by-side with a 3rd generation iPad. The first picture below shows the two tablets outdoors, each with maximum display brightness. Both look great, though both show some reflection.

The next shot below shows the machines in bright daylight, but in the shade and from an angle. The Motion tablet controls reflections a bit better than the iPad. This, though, remains an area for improvement. Likewise, the surface is quite fingerprint-prone. That was a surprise as when we examined the predecessor F5v, we noted that the Gorilla Glass display was “much less smudge and fingerprint-prone.” Perhaps this has something to do with the F5t’s projected capacitive touch layer.

The next picture shows the toughest possible scenario for any transmissive display, that of facing a sunlit sky. Here, even very high quality displays lose most of their contrast, though unlike in the
Motion F5t Tablet PC: Summary

The latest version of Motion’s F5 “field tool” has received yet another major power boost thanks to a switch to the Intel 3rd generation Core processor platform. The performance increase is massive and clearly noticeable in almost every aspect. Our benchmarks show an overall 2x improvement over the predecessor model.

Most amazingly, even with the much more powerful processor and the same size battery, battery life has improved significantly, rather than gone down. It’s still not the 8-10 hours consumers have come to expect, but then again, the Motion F5t is a powerful, full-function Windows machine and not just a media tablet.

The F5t’s 10.4-inch 1024 x 768 pixel Hydis AFFS+ display remains stunning. It is perfectly readable from any angle and any direction, without any color shifts whatsoever. Outdoor viewability is very good, and the screen is bright and vibrant. The new version now comes standard not only with pen input, but also with capacitive two-finger touch. And there is break-resistant Corning Gorilla Glass to protect your investment.

This latest version of the remarkably tough and rugged Motion F5 tablet platform retains all of its original qualities (light weight, carry handle, scanner, RFID, easy to clean, etc.), but the underlying new processor technology and the addition of capacitive touch have made it much more useful and ready to shine either with Windows 7 or with the upcoming and more touch-oriented Windows 8.

– Conrad H. Blickenstorfer, Editor-in-Chief, RuggedPCReview

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