GUIDE: 10 Hints

on selecting your next networking server vendor and equipment

ServerU

For **BSD** and **LINUX** FOSS systems

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Buying networking-centric servers for BSD and Linux based systems is challenging matter of compatibility, performance proven and stability stress testing, specially for mission critical environments.

This guide aims to make you think about 10 relevant points on that matter, while presents ServerU Inc's perception about the subject.

We hope you like and think it's useful. For comments, suggestions and your opinion, contact our Customer Care: ccare@serveru.us.

Pedro Chaves
ServerU Lead Service Analyst
ServerU Installer Author

GUIDE - 10 HINTS ON SELECTING YOUR NEXT NETWORKING SERVER VENDOR AND EQUIPMENT FOR BSD AND LINUX FOSS SYSTEMS

> At least two among the top three general purpose rack-mount server vendor as well as network appliance vendors have a bad history of changing components without clearly mentioning

1) Stable, mature and proven server lifecycle (and lifespan)

Every known vendor for rack-mount servers have their devices names and models on the market for years. In the average a product line is kept for five years. A server system after passed serious burn-in tests and having reliable manufacturing process tend to last for seven years. That, by itself, is a contradiction promoted by many vendors: you are expected to renew your servers every 5 years, when usually it will find it's end of life and vendor support, while the device could still run for at least 40% more time.

But that's not the main issue. Is that exact server name and server version always the very same server, with same expected components, chipset versions and assembled the same way?

Usually not.

At least two among the top three general purpose rack-mount server vendor as well as network appliance vendors have a history of changing components, chipset versions and firmwares and sometimes memory and disk brands as well as disk controllers, without clearly mentioning. It means the same server, with the same name and model you bought one year ago, may be different from the one you will buy today.

It's an usual habit for desktop vendors too. Usually because their component suppliers will make a better price for a different chipset, or when your vendor changes their component suppliers by a competing supplier. But the real problem is when the appliance manufacturer won't change the model version, or clearly mention it's another model revision and therefore, subject to a different behavior from what customers should expect.

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It's a more sensible matter when it comes to FOSS (*free and open source software*). Linux and BSD systems tend to have their best device drivers developed by the very same team which makes the operating system, not by the vendor. Therefore, device drivers reliability and stability is a time consuming maturity cycle. There is absolutely no guarantee that an Intel NIC will behave the same as another Intel NIC chipset, or the same as a Broadcom NIC. In fact it's quite sure that they will not behave the same. But if they will be better, worse, or for your usage profile both will be sufficient, it's a matter of testing and proving it again.

The same is true about disk controllers, disk suppliers and models as well as main board chipset's basic features like ACPI version or BIOS/UEFI model and version. A very small change in the hardware architecture tends to be a big change for mission critical environments running BSD and Linux.

On Windows and Linux systems such a change might not be immediately noticed. Because network devices once basically supported will just be Windows NICs or eth0, eth1, ethN devices on Linux. The same is true for disks which are recognized with the same generic device names.

But on BSD systems it's more transparent since network device names tend to be different for different device series. Disk names may change accordingly to controller devices, and so on, meaning a typical BSD sysadmin tend to notice it's a different hardware, even though you read the same model name and number on the front-side label of the chassis.

So you should ask your server and network server supplier of choice what's their product lifespan maturity process. When will components change and specially when has the components changed last. You might be surprised on how often it changes. Other than inquiring your vendor, try to check it by yourself, comparing the same product line you already own with new ones, or asking dmesg output from another friend engineer, CIO or sysadmin that run that product.

The ServerU sense

ServerU experience and perception about product line maturity and stability is related directly to the network server model name and number you are buying. Any small change in the components will be clearly reflected in a big change in the product name.

For instance, here are some server models we've manufactured in the past or we manufacture today:

- ServerU A-100 (EoL)
- ServerU A-200 (EoL)
- ServerU Netmap L-100
- ServerU Netmap L-800

In the past, when a single component network bypass version changed, ServerU A-100 became ServerU-A100b. When ServerU A-200 had a component vendor changed, the server upgrade was clear reflected on the product name which became ServerU A-201.

Meaning if ServerU Netmap L-100 change, the product name will be changed to clearly reflect it's different from the previous one. The same for L-800 is true and any further rack-mount servers we manufacture.

This is to say: no single cable, wire or screwing component will be different among any number of ServerU Netmap L-100 or ServerU Netmap L-800 devices.

2) The smoke and mirror factor and RFC-2544

A 1Gbit/s port is always a 1Gbit/s, despiste a small deviation on actual real throughput, right?

At least two among the top three general purpose rack-mount server vendor as well as network appliance vendors have a history of changing components, chipset versions and firmwares and sometimes memory and disk brands as well as disk controllers, without clearly mentioning. Couldn't be more wrong.

Every single hardware aspect matters from the moment a packet is received, allocated, queued, processed and transmitted. And it matters literally thousand times per second. It's the network interface card's packets per second rate which is usually the most important bottleneck, other than the number of bits per second transmitted. Bus width, interruption rate, the ability to optimize interruption by both hardware and operating systems' device driver.

In fact every 1Gbit/s port tend to reach 1Gbit/s rate under some circumstances. Usually the easiest way to reach such a rate is to send and receive large packets. Packets sized close to MTU (1500 bytes typically on fast ethernet networks) like big files copy over the network are an easy way to reach high bits per second throughput, since it's usually a matter of a low packets per second rate, low queue processing, low

electrical frequency, but specially low interrupt request rates.

But Internet is not about big packets getting routed, filtered, intercepted, sent and received. Average Internet packet size floats between 500bytes and 700bytes, while important Internet packets such as DNS services' generated and typical packets ack and control are even smaller.

Therefore it's not that easy to an 1Gbit/s NIC to reach 1Gbit/s of Internet traffic. If your mission critical network server will deal with small packets applications such as VoIP, DNS and similar in a dedicated manner, it's even more important to know exactly how your server will behave in such environment before you actually buy it.

It's also critical to understand how your network server will behave with mixed packet sizes when running security critical applications such as firewall, intrusion detection, proxies or web application firewalls.

What you must know for sure is, what are your real expected packets and bits per second rates for various combination of packet sizes, and how will quality metrics — such as latency, packet loss, packet errors and retransmissions — differ on those situations.

Does your vendor deliver server products with reliable and complete reports of expected networking quality and performance? Or they simply deliver a product with that part number, and you are on your own to determine that component quality?

Some vendors seek the smoke and mirror strategy, providing network

> Some vendors seek the smoke and mirror strategy, providing information which are both hard to understand, interprete or to compare to competitor's equivalent information.

performance statistics and information which are both hard to understand, interprete or to compare to competitor's equivalent information.

To fight this smoke and mirror paradigm, the Internet community has defined a minimum methodology to test and describe the performance characteristics of a network interconnecting device, including a uniform report format for easy comparison among products.

It's RFC 2544 (Benchmarking Methodology for Network Interconnect Devices).

RFC 2544 aims to reduce the 'smoke and mirrors' and 'specmanship' that are sometimes employed by equipment vendors. The tests described aim to provide a measure of how a device would perform in the real world.

RFC 2544 describes OOS (Out Of Service) tests. If a customer is already having problems with a network, flooding it with test traffic will only add to the problem; in this case it would be more appropriate to monitor the pattern of real network traffic.

The RFC defines a test as being made up of multiple trials. Each trial provides a piece of data, for example the loss rate at a particular input frame rate. There may therefore be many trials in a test — with the device set up in different ways.

Providing a complete RFC 2544 test report is the minimum commitment you should expect from your networking server vendor. Honestly, it's both safe for the customer and for the vendor to provide such a report. It will determine if an undesired performance behavior is

an expected known limit for the device, or if it's a real problem.

So, a full RFC 2544 report provided by your vendor is a minimum, so you can rely on a uniform performance and reliability data collection to understand the hardware you are dealing with, and to compare to other vendors' options.

But a serious vendor should offer more than a minimum. Ideally, serious vendors provide RFC 2544 tests performed by an independent third party. And this "third party" company performing the tests should also be well known by industry.

The ServerU sense

ServerU is committed to provide the best experience and perception about a product, and it starts before you actually buy it.

Every ServerU product is provided with two RFC 2544 test report. The first test report is always available on the website. It's executed by ServerU our own, with a testing suite we have put together, completely based on *open source* software. This report will show RFC 2544 testing results for the many port pairs, both individually and combined.

Our RFC 2544 tests will also be performed with different operating systems on the ServerU device as the DUT (device under test), for specific DUT functions such as firewall, intrusion detection, routing and BSD Netmap performance for Netmap server series.

Our testing suite goes beyond RFC 2544 and will also provide memory and disks performance statistics.

This testing suite we put together is used on every single ServerU networking server you buy, in our double quality control burn-in testing phase, before the server is shipped to you.

The second RFC 2544 report provided is performed by Ixia, an industry-trusted third party company on such a test. Usually testing is performed by the IxAutomate RFC Benchmarking Test Suite. Those reports are provided by ServerU upon request.

Therefore, you can easily compare ServerU's executed tests with Ixia's executed trials. It's the same third party reports provide by Cisco, Juniper, Palo Alto among many other vendors which provided appliance solutions made up of hardware + software.

And we provide those assets so you can rely on it for your open source system of choice.

3) Tested and proven advanced network features and technology.

You want the best technology industry may offer to you, is that technology tested and proven in your *open source* operating system of choice?

Today's highly networked environments demands industry to optimize their products, create new technology and take most benefit of existing servers bus and CPU.

To target individual interrupts to different processors, meaning, to actively take advantages of SMP networking, which is critical for high-speed network applications, MSI technology won't do; thus, MSI-X is required. Are both your networking

server and operating systems, altogether, fully MSI-X capable? Check it out!

To make sure your system won't run out of CPU 'cause of excessive interruption request from you network cards, Adaptive Interrupt must be completely supported by both, OS and hardware. Under special circumstances, *device polling* features in the OS will also bring benefits on interrupt offloading.

Talking about multiprocessing (SMP) features on high-speed networking, specially routing, what's the benefit on running a multi-processed system if the networking cards will not support multithreaded *device drivers* or if the operating system won't provide it? Are your networking chipsets SMP aware? Do they offer multiple individual queues which can be processed separately by different CPU cores? Will the NIC provide enough queues to take advantage of all your processors? Because it's not fully efficient if you have 8, 16 cores (mor more) but you are able to have only 2 or 4 individual queues in that busy and critical 10Gbit/s port.

Meanwhile, having multiple queues but allow your OS to keep context switching each one — meaning, moving queue threads from one processor to another — will also result in CPU waste and, under critical circumstances, packets latency or loss. So, you should have the ability to do CPU Affinity adjustments your own, or automatically by your system. Therefore your server shall support it, and it should work correctly with your system of choice.

Not to mention basic technology features such as TCP Segmentation Offload (TSO) and Large Receive

Does your actual vendor really care, test and specially support, all those technology aspects for the system you will run? Check it!

Offload (LRO) which shall be provided by your hardware components and supported by the system.

There are many things to check, and probably you are not familiar with all of them, or you simply don't have the time or look at all of those details. And you are right, you should not have to care about that. That should be a vendor duty, a vendor you rely and trust on.

After all when you buy a hardware, you are not paying the basic amount of all components put together. Adequate consulting, care and support are basic pre-sale commitment you should expect.

But does your actual vendor really care, test and specially support, all those technology aspects for the system you will run? Check it out!

The ServerU sense

ServerU designs and manufacture its server for our very own usage in the first place. And under ServerU concerns, those features are a must to be supported, tested and provided.

Therefore, the best experience and perception for technology support we want to provided you, is the same experience we want to have.

All of our server chipsets are handpicked. It means we will choose exactly the chips we know will provided the features required for the best networking performance under a server class, as well as the ones which are best supported by BSD and Linux operating systems. Bus signaling, width and speed are all calculated to perfectly fit the engineered server as a whole.

> Systems such as Linux and BSD often sets a new standard on networking technology. Innovative performance and features are usual in implementations such as Netmap and PF_RING.

MSI-X interrupts are supported and tested; multiple queueing capabilities are provided in such a way you can take full advantages of the number of CPU cores and memory capacity available in the server. CPU Affinity are fully tested, specially under BSD systems with massive cpuset(1) affinity per IRQ tuning on our quality control burn-in tests; other features such as Adaptive Interrupt, LRO, TSO demand we pick the best chips for Linux and BSD. Usually that's why we focus on Intel technology today on both main board chipset as well as networking ones.

We care about every single aspect of advanced networking technology we provide you, as if it was to be provided to our own — because in fact, it is.

4) Are your best OS features tested and supported?

Today's advanced open source operating systems offer technology features that usually leave other systems behind. Systems such as Linux and BSD often sets a new standard on networking technology. And your hardware should provide base capabilities to allow those enable those technology.

To mention a few, advanced features such as the amazing Netmap technology developed on FreeBSD and implemented on Suricata IDS, adding the ability to capture and process millions of packets per second on certain network card chipsets, with the same CPU and memory power that would allow for just a few hundred thousand packets per second without Netmap. Netmap is also used for packet filtering, network bridging and packet forwarding allowing existing hardware

to exceed any expected rate of packets processing and transmission.

On the Linux side, technologies such as PF_RING will provide high-performance capabilities to intrusion detection systems as well. Will also provide special sockets with performance enhancements, user-space DNA (Direct NIC Access) and Libzero for zero-copy technique on DNA capable networking cards.

Your FreeBSD and Linux systems are probably capable of taking more advantage from your server than you've planned; more than the expected default, when you run applications that benefit from those technologies if they are enabled. But to allow that capabilities to be available, your hardware shall be prepared.

Do you want a networking server to provide the best standard performance an open source system may provide, or you want to overcome the best standard and reach astonishing performance rates?

The ServerU sense

ServerU aims to cater the best performance solution as a whole to each single customer. That's why we've chosen open source operating systems to support, in the first place. BSD and Linux technologies exceeds usual expectations on networking performance — specially FreeBSD, with a known, proven and confirmed reputation to outcome network performance in the most different application environments.

We not only support, test and deliver top technologies such as PF_RING and Netmap. We promote it!

> Can you ssh in, have a dmesg output, or be connected on your hardware burn-in test phase before it's actually shipped to you?

We want the ServerU experience and performance perception to be something always available and remembered as supported.

We name or products to make sure such capacities are backed.

ServerU Netmap L-100, ServerU Netmap L-800, they are all named after the performance feature. Every single chipset is chosen for ServerU Netmap series with intent to support PF_RING and Netmap, among other technologies which makes Linux and BSD stand apart.

5) Hardware individually tested, ability to validate it before you buy?

Server vendors tend to provide performance statistics, quality and stability based on tests done after the engineering process, or compared to expected results in a quality control flow that does a single test after the server is assembled. Usually that's ok to ensure a simple general purpose quality control.

But for mission critical applications, more than a simple quality control test or massive sampling tests are required.

It is good for both vendors and customers that a server is fully tested on every performance & reliability aspect. A special burn-in test phase should be applied to individual servers before it's delivered to the buying customer. And sometimes a customer needs more. You may need to have access to the server, do some basic testings and software probing before actually determining if the device will be good for you.

Does your hardware vendor allow you to ssh into a server before you buy it? Does your vendor rely on a single quality control phase, or do they

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provide full individual tests before shipping it to you? Ask your vendor about that, and validate his position. You may not need individual testing reports or to ssh into every server you buy. But if you need, you shall know about that in advance.

It's a known fact that most hardware problems that may show up in the first months of production, can be anticipated in a serious and severe burn-in process. How's your vendor quality control tests before your server is shipped?

The ServerU sense

We will do our best to endeavor you the ServerU experience and your next server perception before you buy it. Even if you are thousand miles away from our offices.

ServerU Inc is proud to deliver servers which are submitted to a a double quality burn-in testing phase: a 48 hours burn-in first phase with FreeBSD, after every server is manufactured, plus a second 48 hours burn-in test phase, with your system of choice before shipping;

Every single server is individually tested, and testing is run with the very same testing softwares (ServerU testing suite) as mentioned on the website; RFC 2544, memory, disks and CPU tests are all individually evaluated, and testing data are archived by ServerU.

Individual components are inventoried, including serial numbers, mac addresses;

So, if you want to ssh into your server before it's shipped to you, or if you want to ssh into a similar server before you

make your mind, you are completely welcome to do so. Thanks to our ServerU Installer service, it's easy for us (as easy as for you) to install any supported BSD or Linux server on a ServerU box, so can have previous access to it.

We can also give you full ssh access during the second burn-in test phase, if you need to — not part of our process, but no big deal to do so.

In the past we have even provided a testing environment, adding a ServerU box as a DUT (device under test) and 6 other machines directly connected to the ServerU DUT and providing ssh access to all seven machines. If you have a reason for special tests before you hand over a ServerU device, we will arrange it.

And if you need something more simple, as receiving a dmesg output for your next ServerU box, we will arrange it as well.

6) Handpicked chipsets.

Is the latest technology always the best option?

In the *open source* world device drivers tend to be developed and maintained by a strong community of experienced hackers. And it takes some time to for those people to hand over new hardware, test and fully stress it. Some vendors like Intel is somehow an exception, since they provide *device drivers* in the form of kernel modules for their server hardware for FreeBSD and Linux systems, to mention a few.

Either way, new hardware tend to take time to determine when it's bug free, completely reliable and production

proven. The same is true for the software part. Device drivers also take its time to fully mature.

If you are on early adoption of new technology, chances are you will deal with hardware and software submitted to only a few days (or months) of full stress tests in real-world production.

Therefore a server hardware chip set, specially regarding main board and networking chip, should be time matured and proven. The same is true for the operating system drivers. To have a proven stable, reliable and with good performance system, both hardware and software must take their time under heavy production environments.

Some vendors are in the early adoption strategy, switching technologies to newer ones right after it's released. Their reasons are diverse. From best prices and component manufacturer lobby, to volume integration of fresh production silicon. It's not all bad, but you are certainly a testbed when you are one of the early adopters of such a new technology.

According to Frank T. Rothaermel, autor, researcher and market analyst, technology industry lifecycle on new engineered parts takes in average 5 months to move from Introductory technology level, used by early adopters, to Growth level, used by early majority. Full majority, late majority and laggards takes 4-6 years.

Therefore it takes its time for a new chipset to become established and proven. And we don't only mean the basic technology and functions behind it. New instructions, new techniques such as today's standard desired ones

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like TSO, LRO, MSI-X, Adaptive Interrupt, multithreaded queues, to name a few, took their time to reach full maturity (and took annoying bugs before it happened). Not to name the obvious metrics for performance, stability and reliability.

So, think about how your vendors picks a chipset to add to a new server, and how proven the chipset is. Not the chip alone, but how mature it is with device drivers from your open source system of choice. Specially BSD systems which tend to take some extra time to support new hardware.

The ServerU sense

ServerU Inc has a good relationship with silicon valley component manufacturers, and we have early access to most hardware industry will put in the market. However, we try it under extreme circumstances for a long time after Linux and BSD support is available.

ServerU provides its experience and perception to customers because we had our best times before, using that chipsets our own.

We hand pick every single component. Every single chipset. Never before we intensely stress it for at least 6 months.

For main system chipsets we reach the best level of ACPI support on BSD and Linux systems, and best performance level for South Bridge I/O instructions, as well as best performance and adequate capacity for North Bridge, with special focus on PCI Express to memory and CPU bus and instructions capacity. Instruction sets are targeted to what the industry has best to offer, but what open source systems and user base actually wants.

For networking card chipsets, we search for the best interrupt-handling hardware, most tunable and with best MSI-X, CPU Affinity and SMP capabilities. Not to mention offloading capacities which are basic requirements for ServerU.

We tend to search for the best cards under igb(4), ixgb(4) and ixgbe(4) Intel server class. For systems with 2-4 CPU cores we aim to provide the best ones under igb(4) and em(4) class. We hand pick the best ones, the ones we want to run in our own data centers, our own FreeBSD (ProApps) and Linux systems.

Hand picked server chipsets for open source systems. — It's our policy, our rule of thumb, our moto.

7) Integrator, reseller, manufacturer or VAR.

What is your hardware vendor's role in the computer industry? When your server peddler makes clear about what you should expect from them, it's great for both customer and supplier.

There is a usual confusion — sometimes promoted by some vendor's interest — wether a supplier is the manufacturer, who really does design, samples, test and build the most important server parts that make up your server; or an integrator, who buys individual server parts and assembles 'em, making up a complete server but without making in fact any component or part.

Both kind of suppliers tend to offer a good support chain for their products, including performance tests, hardware technical assistance, and usually in strategic alliance with software makers, some level of operating systems support: usually Microsoft Windows and

sometimes one or another flavor of Enterprise Linux are the common place. They also tend to promote their own brand, own trademark, therefore another positive aspect of those kind of vendors is that they tend to care for their brand and defend it, hopefully with good support and aftermarket quality.

Sometimes your supplier is a re-seller, meaning he will buy devices already built and assembled, from one of those vendors previously mentioned. Usually they won't offer much support or commitment themselves other than trying to offer a good price or a more complete supply chain. In the hardware industry, re-sellers usually have no big profit margin and therefore they won't offer much more than the product itself.

Those vendors clearly rely on the brand they sell, this brand's reputation and the whole support and aftermarket ecosystem. Maybe they will provide some kind of *"level one"* support, usually meaning you are never sure who to talk to when it's a technical issue, and you will waste some time scaling through the support levels until you find someone to help you. This is specially true when we are talking about a *channel* reseller: they shall provide some basic support level before you can reach someone else.

A better breed of a reseller are the Value Added Resellers (VAR). They will sell you a server they don't manufacture or assemble, but they will provide more value, service and assistance on the product other than just delivering it. VAR tend to offer good consulting on product classes and capabilities as well as specialized technical assistance; most of this quality come from a number of requirements from the manufacturer

itself, who usually set a standard for suppliers to hold their VAR label. This kind of *valuable* resellers are usually faithful to the manufacturer, which is another good point.

So, other than understanding your vendor's role, is that role clearly promoted, or they want you to believe something they are not? You should know exactly what to expect from your vendor.

The ServerU sense

ServerU Inc wants to make your perception clear about what's our whole in the industry. We want to provide you a unique experience on networking server supplying, in such a way you know exactly what to expect and demand from us.

ServerU Inc designs, samples, tests and make servers for *open source* systems. Precisely, we manufacture the main board circuits, we engineer bus decisions and signaling, and we hand pick every single component that will compound our server boards to make up the best server hardware in it's class. We design embedded systems, meaning we want the smallest number of movable parts in the system, minimizing the statistical rate for problems, and also reducing the need for server cooling. We also want to provide a server that is low energy consuming — just like every embedded system should be.

And we also integrate silicon valley's best hardware manufacturers, such as chipset makers (we mainly focus on Intel chips and components) and the good components we don't see a reason to manufacture because there are great quality options to integrate in our

servers, such as memory banks, compact flash, and massive storage devices.

We also don't manufacture our 1U rack-mount chassis, we believe we have a quality supplier for that, and this way we can provide good pricing to our customers. This might change one day if we need a special chassis. But not today.

We also integrate the power supply unit. We have special needs for power options since, as stated, we are committed to provide low power consumption servers. And we also supply a variety of power input for the many data center and ISP standards, ranging from 36Vdc to 220Vdc voltage. We have a great PSU supplier we integrate in our server solutions.

And we back every single component we don't manufacture. We offer immediate replacement for parts — although they won't fail soon, after passing our double quality burn-in test phase.

8) Proprietary or free software. A proven expert in your system of choice.

If you are willing to select and buy a new server either for a free open source operating system or for a proprietary OS, you should look for good level of expertise in your system of choice. Specially because though the lifecycle of the server, big chances you have to demand a level of technical support service.

Carefully selecting a vendor who both supports and aggressively tests the hardware on the exact system you will run in production, will assure you that all

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devices that make up the equipment will not only be properly probed and controlled, but will perform in the best possible rate, bringing maximum performance the server may provide, as well as bearing the advanced performance and offloading features, not to mention support for the innovative technologies that make a difference. After all, that's why you chose to run free open source software.

Add to that the stability and reliability guarantees that only an expert conducting stringent tests can achieve.

Whenever possible, it is appropriate to seek suppliers that go beyond, and in fact seek to certify the equipment for your operating system of choice.

A few vendors in the market have proven experience in consulting, support and development on your system of choice, and it's a desirable differential. Limited count of networking server suppliers are able to offer proper planning for your environment capacity, running your system of choice for the brand new hardware that will be acquired. A smaller set of vendors will do that free of charge, on a pre-ordering process.

If your usual vendor won't do that, you have to take those steps and provide all tests and planning by your own — or switching vendors, for sure. This is specially difficult if you are not familiar and have no access to every individual component, with same chipset hardware that make up the server.

The ServerU sense

ServerU Inc is a company primarily driven by *free software* experts. Our team is on this market since 2002, it

means it's more than 10 years, more than 10K hours expertise on assembling and selecting server parts for open source operating systems, both BSD and Linux.

We know the industry players and their offers, and we know exactly where they either technically or commercially fail.

Aiming to provide a unique ServerU experience, we decided to make servers our own, and we were already 10 years expert when we started.

For a couple years we have delivered ServerU equipment for our current existing customers and for our own, using it together our ProApps FreeBSD based appliance and therefore delivering a complete solution, a software made for severe mission critical challenges, and a hardware carefully manufactured for this software.

When we had our first ServerU model delivered to our existing customers, we already had literally a couple years of hardware engineering and architecting expertise. And from 2012 until 2014 we delivered a good number of *appliances* in several projects we signed. The result after two years was proud number of zero RMA. No single component replacement or repair. Not a wire! And it made us pretty confident that we could provide the best ServerU experience perception when we made ServerU available to general public.

We make servers for *open* source Unix-like OS. We design, manufacture, test, enhance and search for the industry certifications. We back BSD and Linux, supporting it on our hardware. We are experts. And we breath to make our expertise result in the best experience

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you can have on networking servers made for free open source software.

We strongly agree with A. Kay, who used to be quoted by Steve Jobs stating *"People who are really serious about software should make their own hardware"*. Therefore, ServerU is open source designed, tested and supported hardware. Because we are serious about software.

9) Easy and supported installation of your system of choice.

Networking appliances are not general-purpose servers, are not generic computers. You can't always expect to plug a USB memory stick or optical disk device and simply install a system. Many networking appliances tend to seek hardware security compliances, including NIST special recommendations among other best practices.

Some times it means no video output, but controlled serial port access; no direct access to networking interface cards' memory without prior special software authorization.

Using the generic release media provided by your Linux or BSD free software project might need some previous work, including installation media refactoring, basic I/O customization, serial port reconfiguration, baud rate setup, DNA software alignment and authorization. Not to mention device drivers availability and correct configuration.

Are you on your own? Or can you rely on your vendor's support service and technical backing?

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Make sure your networking server supplier does support your open source system of choice entirely: production running, preceded by preparation and tunning, preceded by adequate and rational installation. Installation is the first important step on getting your system completely ready for the upcoming heavy duty.

The ServerU sense

ServerU Inc made it an effortless and good experience.

In order to ease the maintenance of ServerU by customers themselves, we created ServerU Installer, a simple application, light and very easy to use. With this app you can cloud-install any compatible operating system you like in your ServerU. From FreeBSD to Ubuntu; from pfSense to Endian and Mikrotik, the ServerU Installer offers several Operating Systems, ready for you to use and already properly configured for your ServerU model.

Installing, formatting and switching operating system is now easier than ever.

Most *ServerU Installer* listed operating systems are not only available. They are tested, certified and formally supported to run on ServerU networking server hardware. BSD or Linux based, they are tested, performance and functionality is certified and we are fully committed to support it.

We made it easy.

10) Provided drivers and utilities for hardware your OS won't control.

While an integrator or reseller will always delivery servers made up of components backed by the original

component vendor, a server manufacturer will — hopefully — provide exclusive and differentiated hardware as a wider solution.

Therefore, *software* and *device drivers* for parts not integrated from third party must be catered by the manufacturer himself.

So the obvious question is: how's your FOSS operating system of choice supported by your vendor, regarding drivers, utilities and other software?

While supporting userland command line utilities for BSD and Linux is relatively simple once the software is written, kernel *drivers* and other *devices* is not that easy. Every new kernel version may affect previous drivers, so, it demands individual tests and potential changes.

Living on the edge is not possible. Different Linux distributions come with different kernel version. Sometimes a whole different kernel series. BSD systems like FreeBSD may provide more than one production system version, in different kernel series as well.

How your networking server supplier responds to that?

The ServerU sense

To provide the best ServerU experience, our servers deliver exclusive hardware and parts, including keypads, liquid crystal modules, third generation bypass network ports, network acceleration cards, adaptive interrupt offloading, watchdog components, among others.

Those components are not supported by base Linux or BSD kernels, thus, we provide adequate software, utilities and kernel modules which provide device drivers or expose kernel I/O devices to userland.

We won't support systems that reached it's end of life, meaning, you can ask us for a FreeBSD 6.0 or a Linux 2.2 device driver, we may have it, but we may not as well.

Our commitment is to provide the best software and kernel modules for the latest version of the listed operating system, on every production serie by the date.

So, if you are running FreeBSD 10, we will back 10.0. If you want pfSense 2, we will back pfSense 2.2, if you want FreeBSD 8, we will back 8.4, if you want CentOS 6, we will back 6.5, for Red Hat Enterprise Linux, we will back 7.0 — because by the date of this writing, they are all the latest version of production series that have not reached EoL.

One exception might be RouterOS. Although we keep a close relationship w/ Mikrotik engineers, hardware support may take their time to integrate in the system, since RouterOS is not open source — so we can't make it ourselves, but we will always provide Mikrotik our software and device drivers, on the relative Linux kernel version RouterOS is based on.

In the best interest of your perception about our commitment, we will always make it a transparent policy; crystal clear.

> How's your FOSS operating system of choice supported by your vendor, regarding drivers, utilities and other software?