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Considering Desktop Virtualization Plus Unified Communications: What IT Architects Need to Know

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Executive Summary

Growing adoption of Unified Communications and Virtual Desktop Infrastructure creates the potential for conflict, as VDI solutions must support real-time voice and video applications, and vice-versa. But VDI combined with UC also offers opportunities to simplify desktop environments, and securely extend UC to mobile platforms. IT architects must proactively plan for the combination of UC and VDI or risk finding themselves with users disenfranchised from one or the other, wasted resources, and thwarted strategies.

The Issue

Enterprise adoption of both desktop virtualization, primarily in the form of Virtual Desktop Infrastructure (VDI) and Unified Communications (UC) are growing steadily, presenting opportunities for IT managers to reduce costs, simplify management, improve end-user experiences, and improve collaboration—but these dual trends are also creating challenges in supporting real-time, bandwidth intensive applications over VDI. Architects need to address issues related to voice and video capture and playback, media transport, and network performance management to ensure a successful deployment for UC (and other media-rich applications) over VDI. They must also address the growing need to support UC over VDI for an expanding range of devices including smartphones and tablets.

UC Trends: A Richer Desktop Experience

Unified Communications has emerged as a critical tool for supporting the collaborative needs of an increasingly distributed and virtual workforce. Driven by needs to promote collaboration among staff not physically co-located, as well as between staff and customers or suppliers, and by the desire to take advantage of

improved technologies such as integrated voice, video, and Web conferencing for richer and more effective collaboration, 63.8% of companies will have deployed UC tools by the end of 2011, according to Nemertes 2011-2012 benchmark of enterprise IT. (All figures quoted here come from this source.) Most of the remainder are deploying in 2012, or evaluating and planning a UC strategy. Only 12.1% of companies have no plans to deploy UC.

The goals of unified communications are two-fold:

- To integrate disparate communications applications into a common set of user interfaces accessible across fixed and mobile devices.
- To integrate those applications into business processes, giving individuals and teams the tools they need to communicate within the constraints of specific operational requirements. The extensible nature of UC allows IT architects to embed communication and collaboration capabilities throughout the suite of business process applications.

A key trend in UC deployments is a shift of applications such as voice and video from the hard phone to the desktop or laptop PC. Eighty-five percent of companies are deploying, planning to deploy or evaluating softphones as part of their UC deployments, while 79% are doing the same for desktop video. Desktop video conferencing is growing rapidly: for example, 31.5% had more than 100 seats in Q1 of 2011, and that will climb to 40% by the end of year (25% growth); likewise, 16.7% have more than a thousand seats, going to 23.1% yet this year (38% growth).

VDI: Reducing Costs and Complexity

So, enterprises are building desktop-dependent plans for UC. What are they planning for the desktop? This year, more than half—52.3%—of enterprises have deployed or plan to deploy desktop virtualization by year's end. Approximately 60% expect to be using virtual desktops by 2013. Significantly, only 14.8% say they have no plans to do any desktop virtualization, a little more than half as many as had no plans last year.

Most organizations using virtual desktops run them on data-center servers, as a virtual desktop infrastructure (VDI). Forty-seven percent of organizations already use VDI, and 8.3% have implemented a distributed version (which places virtual desktop host servers in branch offices, not just the data center). The key reasons enterprises give for deploying VDI are to improve the management and security of desktops, and the quality of the telework experience. They are increasingly also looking to improve the agility and flexibility of desktop services—to provide enterprise applications to users in more situations than ever before. Some are also looking to mitigate the pain and expense of a Windows 7 rollout by keeping Win7 in the data center and avoiding a hardware refresh to handle it at the desktop.

"You've Got Your VDI in My UC"

Given the spread of both technologies through the enterprise, it is inevitable that UC and VDI will have to coexist. Although actual deployment of UC under VDI is currently pretty low—only 2.9% of organizations use them in combination now—a third of organizations are testing tools and evaluating their options. Here IT leaders are often constrained by the inability of their desktop virtualization solution to support UC. "We had to convert over 200 thin-clients back to Windows PCs to support our video plans," says the director of telecom for a healthcare firm.

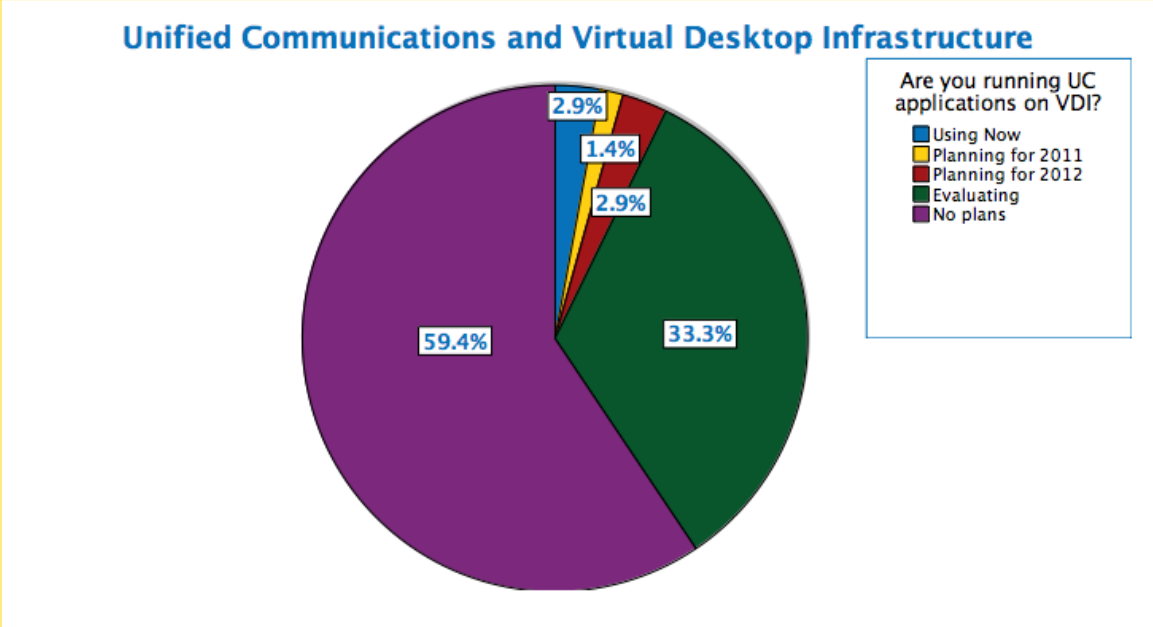

Figure 1: VDI and UC Together on the Radar

Often, these challenges result from the lack of coordination between UC and desktop teams. "We piloted it last year and ran into challenges in terms of support and performance," says the telecom architect for a global financial-services firm. The head of global architecture for a manufacturing company saw similar challenges: "We had issues related to bandwidth and performance. We're going to give the vendors a year to get it right and try again." The voice technology architect for a national retail company says, "We had to scrub our desktop voice/video plans because the VDI solution wouldn't support our solution," reaffirming the need for UC and virtualization teams to work hand-in-hand on strategy and architecture.

The crux of the potential for problems is the need to encode and decode voice and video. It simply isn't feasible at scale to carry raw voice/video data from the endpoint to the data center to be encoded, or to decode it all there and send the video/audio bits to the endpoint. What may work for dozens of connections won't for hundreds, let alone thousands. Delay and processing requirements add up to result in poor performance and excessive costs.

The potential for performance problems, both in delivery over the network and within the data center on the servers hosting the virtual desktops, can be daunting. Some problems follow directly from the wide variability of WAN, Internet, and mobile data performance and accessibility. Being able to reach and use a virtual desktop from anywhere, users would expect to be able to use all the tools within it from anywhere as well, but the longer and less reliable the link between host server and client device, the more dire the effects of latency and packet loss on vulnerable real-time communications traffic (and other media traffic as well). Other problems can come in simply because real-time voice and video traffic is being embedded within the virtual desktop protocol stream; any failure in prioritization or bandwidth management can hurt reliability or performance. So, for robust delivery of VDI services we see enterprises fine tuning QoS settings on their WANs and sometimes deploying WAN optimization.

Another kind of problem can arise when the work of encoding and decoding voice and video traffic is shifted to the host server: a few virtual desktops creating this kind of load would be no problem, but dozens or hundreds could seriously degrade server performance and so virtual desktop responsiveness and usability.

For mobile users, over variable or slow-speed wireless networks, leveraging UC applications over VDI isn't feasible for these same reasons (performance, latency, costs). Thus, with the increasing focus on mobile platforms companies will find that unless they specifically address mobility in their UC and VDI plans, they will lack an effective solution meeting worker requirements.

When the different functional silos in IT have failed to communicate and collaborate in their planning, you see not the integration but the collision of VDI and UC. Given all the potential for problems in delivering solid performance, and the too-common problem of lack of coordination, some organizations are simply ignoring the potential problem for now. The manager of information security at a large manufacturer notes, "We don't think we have bandwidth to test UC over virtual. Let's give them another year to figure out solutions." However, ignoring a problem you are likely to face has never been a long-term viable strategy for IT. Instead, by addressing critical questions in advance, IT leaders can solve UC/VDI challenges and take advantage of the benefits of both technologies.

UC & VDI: Key Questions And Answers Enterprise Architects Need to Know

In order to plan for the inevitable combination of desktop-based UC tools with virtual desktops, IT professionals must make important decisions about the fundamental organization of work in the environment. Here are some questions IT must ask itself:

- What are the various architectural options for running UC over VDI?
  - The basic options are **centralized** and **distributed** processing.
  - **Centralized**: In keeping with the basic VDI philosophy of centralizing PC workloads, centralized UC processing pushes the work of virtualization onto data center servers and networks.

- **Distributed**: This model takes advantage of the power available on modern end-point devices, whether full PC, mobile device like smartphone or tablet, or thin client. Processing of some or all media streams is **handed** off to the local device and seamlessly made to appear as though it is running where the rest of the vPC's work is running.

- What are the pros/cons of each option?
  - **Centralized**
    - Pros: Letting media handling go where the rest of the processing goes makes the execution model simple and predictable and means performance will be roughly the same independent of endpoint device, and that endpoints without any native processing power will work as well as anything else.
    - Cons: Pushing all the work into the data center means accepting the performance hits of doing all audio and video encoding and decoding remotely rather than on the device. It adds round-trip latency to every pixel and sound. It adds significant volumes of real-time-performance traffic to the LAN and WAN and data center network, embedded within the VDI stream. It will also dramatically and unpredictably increase the processing load a single virtual desktop drives, pushing down vPC-to-host stacking ratios and/or hurting vPC responsiveness even for those not using UC tools. For these reasons, Nemertes does not advise the centralized model for UC over VDI for any large-scale deployment.

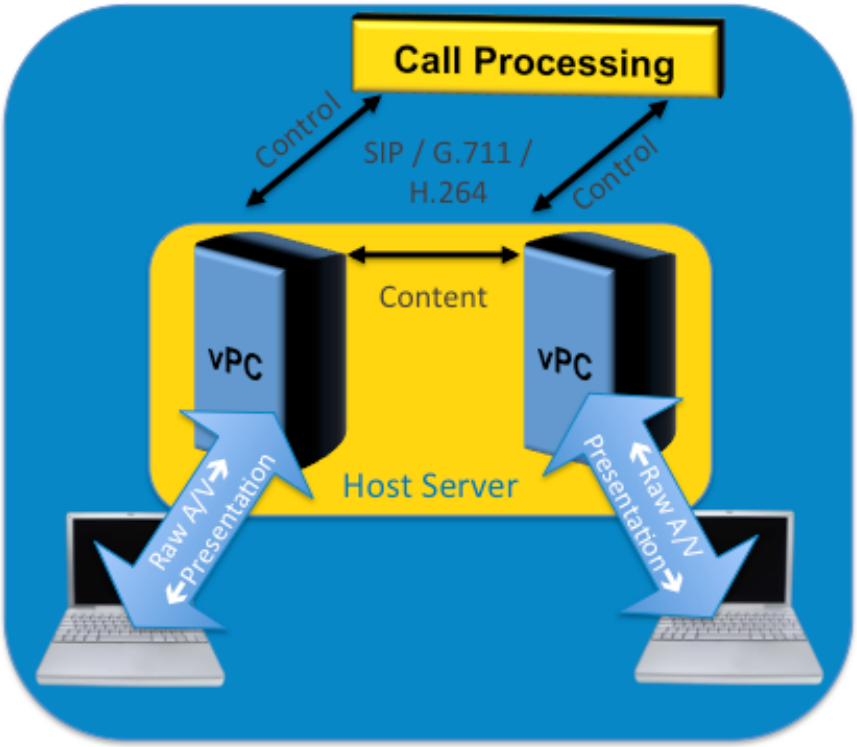

Figure 2: Central Processing of All A/V Data

- **Distributed**
  - Pros: Utilizing the power of end-point devices to process media streams means better media performance as the local processor can respond to media faster. Processing on the client also relieves the load on the server, so performance won't vary depending on server loading. And, processing media at endpoints allows further network optimizations such as content caching, giving IT more options for tuning service delivery.
  - Cons: On the minus side, the hand off of some processing to endpoints while retaining other parts in the hosts, as well as the reverse-seamless integration that makes it all appear to happen in one place, is complex, and makes performance variable dependent on the abilities of the end node.

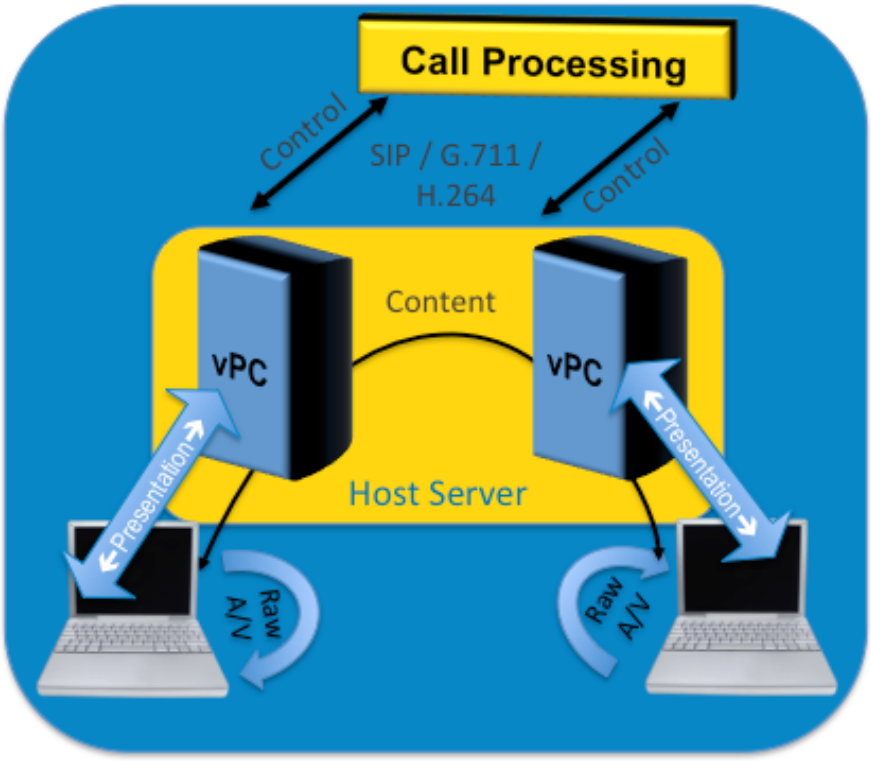

Figure 3: Local Processing of A/V Data

- How will my choices in the data center affect my choices at the desktop (and vice versa)?
  - Consider how host servers must be configured and managed in the data center, and balance the costs of spending additional capital dollars to max out RAM and core counts in order to handle media processing centrally against the costs of continuing to support "fat" clients on the endpoint, with cheaper local processing and memory but higher operational costs in the form of endpoint management.

- Choosing the client either provides or doesn't provide local resources for the processing of the audio/video streams.
  - Fat client—a full PC with operating system—provides local power.
  - Thin client, with minimal software on the endpoint can do so as well.
  - A zero client will not provide the local processing power.

- How can I extend my VDI/UC architecture to support the needs of mobile workers and new devices such as smartphones and tablets?
  - Explore options—mobile-device access clients and platform choices—for letting mobiles process their own audio and video, to help compensate for the less reliable and performant mobile data networks.
  - Explore options for installing direct-access mobile UC clients on mobile devices, or otherwise incorporating them directly into the UC architecture (traditional fixed-mobile convergence.)

The Checklist

Understanding key design decisions to be made, IT must ask their vendors and service providers how they can help address integration of UC and VDI. At the very least, they should ask the following checklist of questions:

UC	•Does your VoIP/UC solution have special support for use in a VDI environment? Are all UC features (voice, video, conferencing, presence, messaging) supported?
VDI	•What range of endpoints does your VDI solution support, and how does it compare to the range you support or expect to support in the next few years?
VDI	•How does your VDI solution handle processing of rich media traffic generally?
VDI	•How does it handle UC traffic specifically?
VDI+UC	•Does the combination of VDI solution plus VoIP/UC solution allow for both remote (data center) and local (endpoint) processing of raw A/V data?
VDI+UC	•If it supports local processing of A/V data, on what range of endpoints?
VDI+UC	•Does handling at the endpoint vary with endpoint type? How?
Data Center	•What are suggested server specs and VM densities (how many virtual PCs per server with a given configuration) when running UC voice/video processing on endpoints? On hosts?
Security	•What are the security provisions for local processing of rich media, in UC and VDI solutions? Is locally processed data encrypted while resident and reliably deleted after use?
Application Delivery Optimization	•Can your WAN support necessary QoS? If it requires additional layered optimization, what optimizers will work best with the VDI solution? The VoIP/UC solution?

Conclusions and Recommendations

Enterprise adoption of both VDI and UC is growing steadily, presenting opportunities for IT managers to reduce costs, simplify management, and improve collaboration—but also creating challenges in supporting real-time, bandwidth intensive applications over VDI. Architects need to address issues related to voice and video capture and playback, media transport, and network performance management to ensure successful deployment of UC—and other media-rich applications—in a VDI environment.

To make the most of UC and VDI together, in addition to asking the questions noted above, IT managers should:

- Test virtual desktops, if you haven't already. The technology only gets better—faster, cheaper, more scalable—and the soft savings on management and security get steadily more compelling as the hard costs come to meet or beat those of traditional desktop deployment. Explore multiple architectural options to find the one or ones best suited to your needs. All organizations begin by asking which use cases could support virtual desktops; by the end of evaluation and pilot, many now ask instead which use cases preclude their use.
- If you have virtual desktop capabilities already, test media applications for compatibility with virtual desktops. Incompatibility is rare for major apps, but performance problems are not.
- Test especially your UC tools under your virtual desktop solutions. Look for how work is distributed, how audio and video perform over WAN links, especially long (high-latency) ones; and how UC workloads affect virtual-desktop-to-host-server stacking. Deploying UC may change your virtual desktop model, your infrastructure costs, and your WAN traffic management and optimization plans.
- Test virtual desktop access from supported mobile platforms. How useful the virtual desktop is will vary dramatically based on user interfaces, screen and keyboard sizes, and processing power on the mobile. So, testing against the platforms most common to your mobile workforce and other key constituents (read: execs with tablets) will help level set expectations at the outset, and let IT focus on ameliorating problems that are discovered.
