



Accelerating Digital Transformation for Communication Service Providers

Wireless Networks and Platforms (WNP)



Consumers are demanding that service providers transform to support their increasingly complex online lives. Nominum's DNS-based platform and integrated application suite offers a path to transform Communications Services Providers (CSPs) into Digital Service Providers (DSPs) that offer higher-value solutions with superior performance, security, user control and customer engagement.

By allowing CSPs to leverage their IP infrastructure investment—just as they do their communications infrastructure—Nominum delivers proven benefits for both service providers and their subscribers.



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1. EXECUTIVE SUMMARY

New consumer needs are forcing CSPs to transform

In today's increasingly competitive environment, Communication Service Providers (CSPs) must add increased value and transform themselves into Digital Service Providers (DSPs) if they are to retain customers and preserve margins. Subscribers are now demanding this transformation, forcing CSPs to move up the value chain along the digital transformation curve.

DNS-based solutions offer a path for CSPs to evolve into DSPs

An extensible DNS-based platform and application suite provides a path for CSPs to evolve beyond a homogeneous, network-centric proposition towards one that is differentiated and subscriber-centric. This path offers immediate user and financial benefits and also helps CSPs to become trusted DSPs as their services:

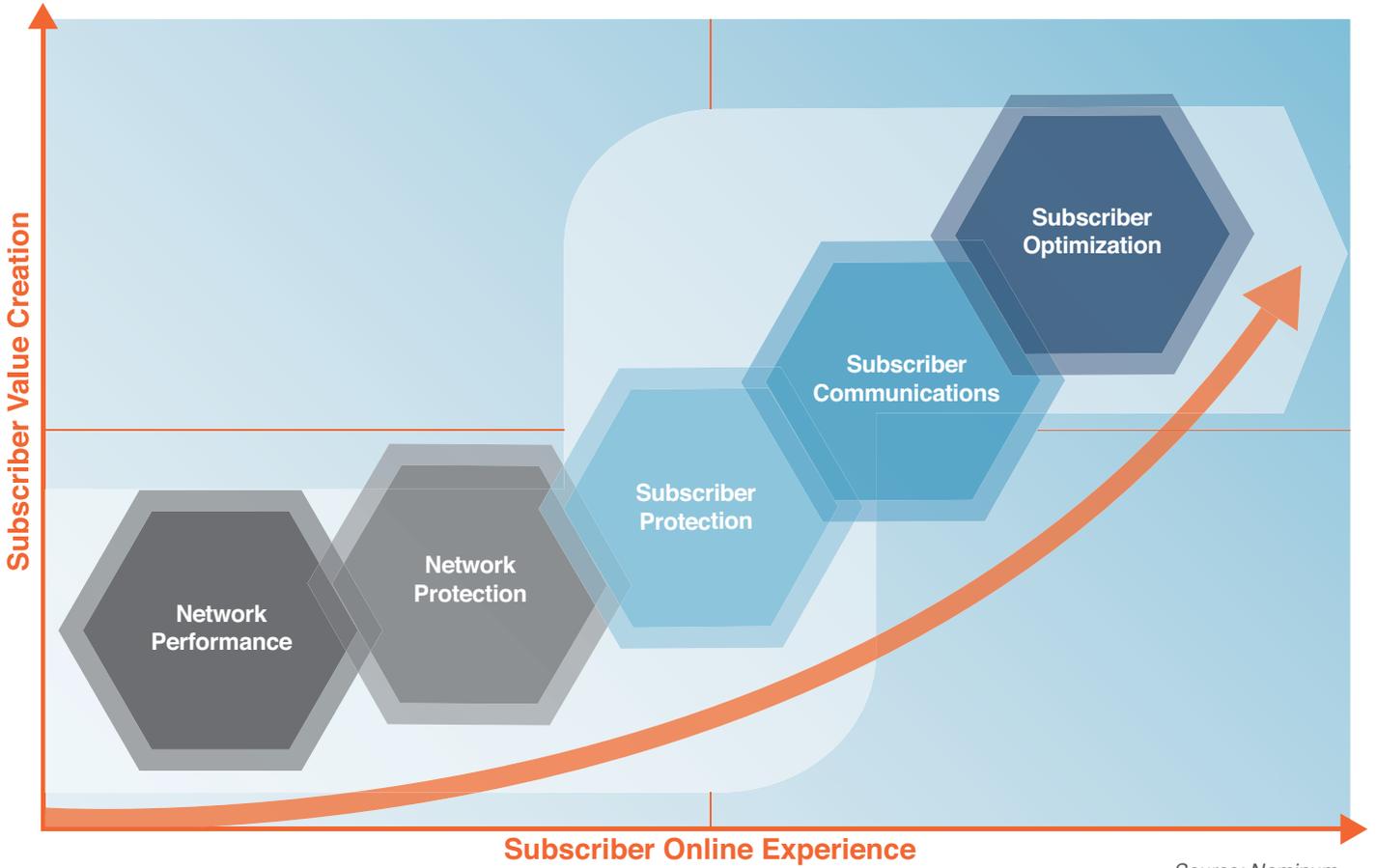
- Build end-user value that makes (and keeps) customers satisfied
- Deliver high performance, cost effectively
- Allow unique configurations that are extensible for every CSP
- Enable better Return on Investment (ROI) with:
 - New service revenues
 - Reduced OPEX for network and service support
 - Better CAPEX utilization with leverage from IP infrastructure

Nominum: uniquely positioned to accelerate CSPs up digital transformation curve

Nominum allows CSPs to evolve into DSPs that have meaningful relationships with their subscribers as they move up the digital transformation curve to deliver network performance, network protection, subscriber protection, subscriber communications and subscriber optimization. In conjunction with all of these, Nominum captures analytics across all services for better customer support, personalization and promotion of new value-added services. Chart 1 summarizes this digital transformation curve.



CHART 1. Nominum accelerates CSPs up the digital transformation curve



Source: Nominum

By using an extensible, DNS-based platform, Communication Service Providers can evolve their operations to provide differentiated and subscriber-centric services.



2. THE DIGITAL TRANSFORMATION IMPERATIVE

Consumers have multiple connected devices per household. In today's world, digital connectivity is a central part of people's lives—for communication, entertainment, education, work, commerce and personal productivity. With the growth in the Internet of Things (IoT), the number of smart connected items in a home is escalating as appliances, toys and home systems are linked. With so much of their lives online, people require digital services that provide security, simplicity, relevancy and ubiquitous personalization.

As always-connected digital lives become more complex, subscribers are looking for increased ease of use, peace of mind and added value.

New consumer needs are forcing CSPs to transform

Security is a top concern. In a recent US survey on Internet security conducted by YouGov, 63% of respondents agreed they would "like it if my current service provider gave me one simple solution that would increase the security on all of my connected devices."

Today's competitive landscape includes Over-the-Top (OTT) players such as Facebook and Skype, content originators like Netflix and device brands such as Apple and Google, all capturing brand loyalty. CSPs—ranging from Internet Service Providers (ISPs) to cable, fixed and mobile operators—increasingly recognize they must continually increase value to their subscribers in order to become more relevant. They must become DSPs.

Digital transformation moves CSPs up the value chain from high-performance commodity 'bit pipes' to value-added providers that enjoy increased customer satisfaction and loyalty. In order to transform, CSPs are changing their culture and business practices and are turning their network infrastructure investments into platforms that deliver rich customer experiences. Addressing the total customer experience throughout the subscriber lifecycle is essential to become a DSP, including:

- The sales and onboarding experience
- User control
- Ease of adding new services
- Self-care

Traditional network operators that embrace digital transformation can increase customer loyalty as they rapidly create new revenue-generating services.

CSPs are turning their network infrastructure investments into platforms that deliver value-added customer experiences.



Digital transformation is essential to achieve greater efficiency, reduce OPEX and enhance customer value. It leverages new CSP IP network capabilities that:

- Increase interaction with customers
- Deliver greater personal control and security to customers
- Create analytics that proactively trigger new service and customer options

Such digital transformation on an extensible service platform will allow CSPs to differentiate their offerings significantly over time.

The transformation requires platforms and tools that enable companies to launch new services rapidly and profitably. Elements in the digital network infrastructure must be capable of migration from standalone utility functions to extensible platforms that increase customer value.

To speed time to market and deliver new service functionality, platforms like DNS are now positioned to evolve from embedded network utility functions to high-performance service enablers.

Agility is essential

As CSPs focus on transformation, they are demanding greater flexibility from traditional telecommunications infrastructure platforms to meet new Network Function Virtualization (NFV) and Software Defined Networking (SDN) requirements for configurability, scalability and instantaneous applications enhancement. The same demands must be met by their IP infrastructure suppliers. To speed time to market and deliver new service functionality, platforms like the Domain Name System (DNS) are now positioned to evolve from embedded network utility functions to high-performance service enablers.

IP networks as a source of added value

Mobile and fixed-line CSPs are still in the throes of the transition to IP and cloud networking that enterprise and ISP networks began in the 2000s. Even though many CSPs are Tier-1 or Tier-2 providers—and their customer access networks are purely digital—they have not fully evolved their ‘all-IP’ service infrastructure.

Many CSPs view their infrastructure as a utility running on Commercial Off the Shelf (COTS) hardware to save CAPEX and OPEX without considering the IP network as a major source of added value.

Service providers appreciate that moving to an end-to-end (E2E) IP infrastructure will reduce costs, but many IP network elements do not yet actively enhance a CSP’s value proposition to its subscribers. There is now an opportunity to add intelligent applications processing to high-performance IP network platforms that will enable providers to both save costs and enhance value to subscribers.



3. DNS AS A PATH TO DIGITAL TRANSFORMATION

CSPs are looking to deliver subscriber value with digital transformation

At Mobile World Congress, UXP Systems presented a survey of CSP assessments on the overall strategic importance of “moving to user-centric, digital service experiences for users of their services.” In the survey, CSPs were asked to rank specific capabilities necessary to provide digital service experiences for users.

The top seven ranked responses from CSPs were:

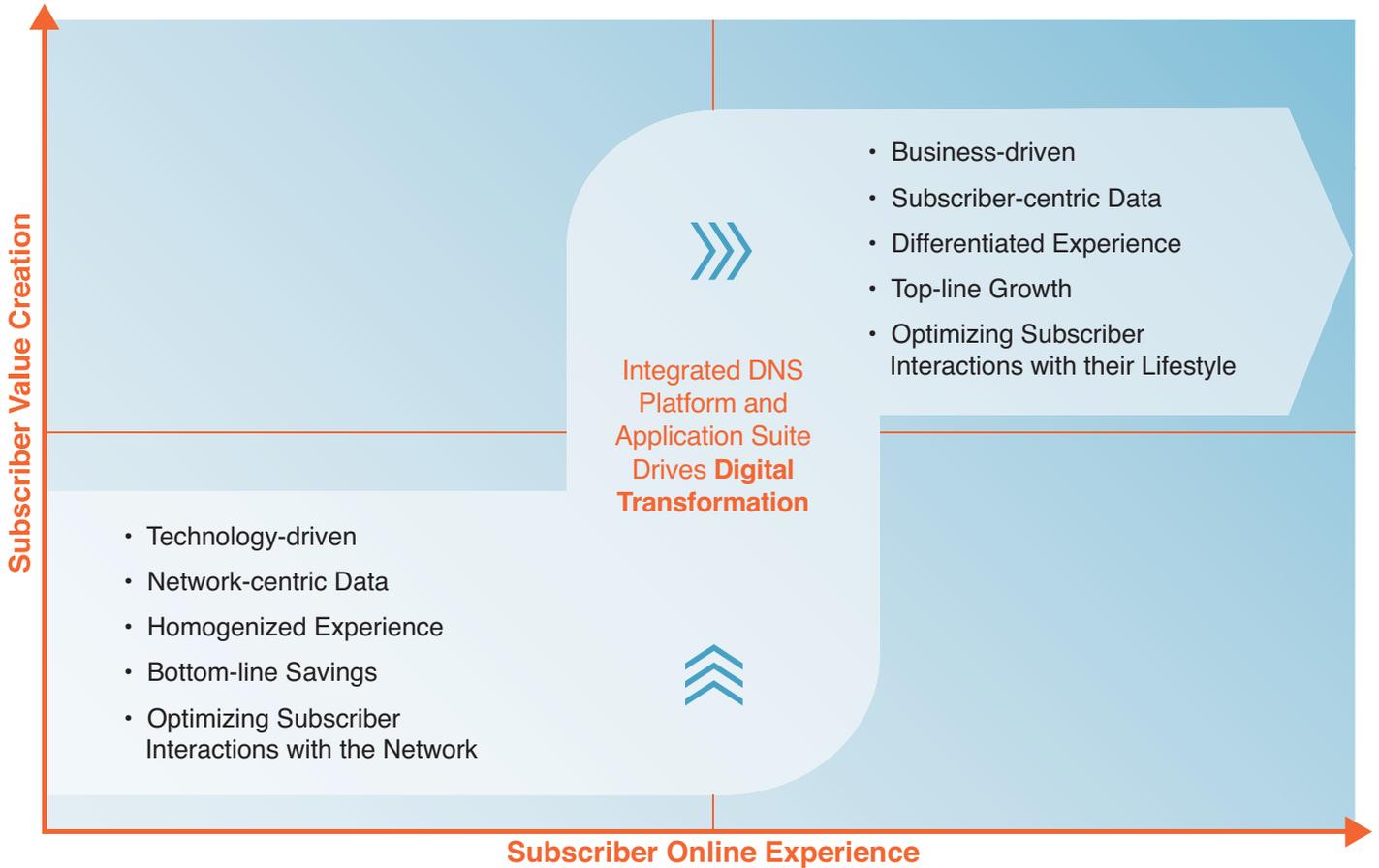
1. **Simplifying the way users onboard to services and manage their services digitally**
2. **Capturing user-level interaction data for every individual user of services**
3. **Being able to give each user specific privileges, preferences and access**
4. **Personalizing self-care and service experience for every individual**
5. **Having a one-to-one relationship with every subscriber**
6. **Merging siloed users across different billing, care and service systems**
7. **Enabling users to self-manage groups, sub-users and profiles**

DNS technology can be leveraged today to drive additional value with customer-centric control and analytics.

DNS is an often overlooked ‘utility’ platform at the real time core of all IP networking. Although it started out as the ‘telephone directory’ for the Internet—matching user requests for application name domains to IP addresses for the requested resources—DNS is now transforming CSPs into DSPs. DNS-based analytics data provides a complete picture of online subscriber activity and allows CSPs to use relevant and real time information to improve services, deepen engagement with their existing subscribers, protect them from malware and other security threats, provide timely and personalized offers and enhance the digital lifestyle of subscribers. Chart 2 summarizes the digital transformation potential of DNS as CSPs move from lower-value, technology-driven functionality (bottom left) to higher-value, business-driven subscriber value creation (top right).



CHART 2. Digital transformation with DNS



Source: Nominum



DNS is perfectly suited to add service value.

DNS is uniquely positioned to enable new services while increasing efficiency

Many CSPs still use only traditional utility DNS servers based on the original open source 'BIND' software that supports basic generic DNS functions. Nominum DNS is uniquely positioned to do more. As part of the automatic flow of network traffic, it observes, in real time, all the application service requests for domain names and the associated 'hits' or requests for access to resource IP addresses. Deep Packet Inspection (DPI) software is an alternative approach that must sit in the data plane to examine every packet and interpret upper layer access protocols. This requires time, interrupts traffic in the data plane and often leads to inefficiency. By contrast, DNS can leverage its role in the network control plane to monitor traffic and efficiently activate relevant application capabilities as traffic flows by—without increased latency or scale associated with traffic growth. DNS is perfectly situated to add service value.

DNS technology that is already deployed supports a safe, personalized Internet experience for consumers and enables many services today.

DNS technology that is already deployed supports a safe, personalized Internet experience for consumers and enables many services today, including:

- Security as a service, with the ability to adjust security controls in real time
- Customer contact and rapid service interaction
- Differentiated service delivery for every subscriber
- Usage analytics for personalized responses to every user
- Smarter, more tightly integrated real time services that cannot be delivered by OTT vendors

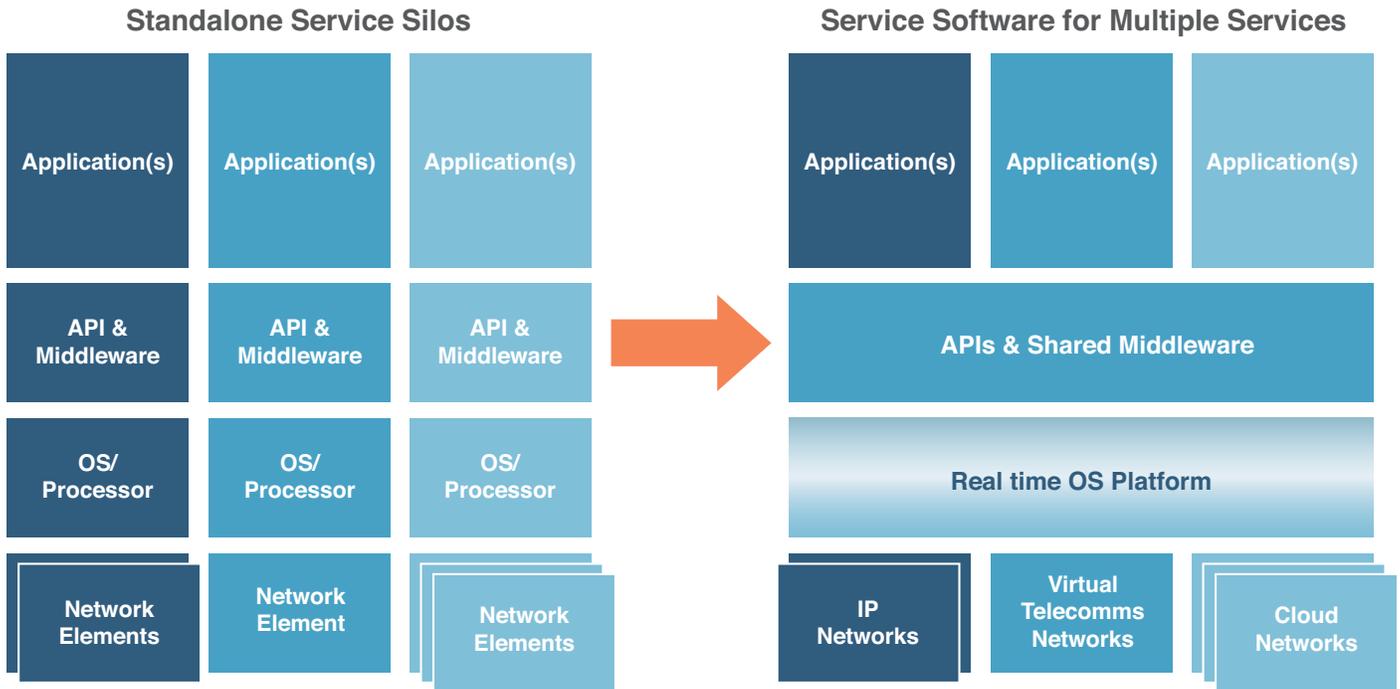
The above services enhance customer satisfaction, significantly reduce customer churn and increase service provider profit margins.

Extensible platform for new services

CSPs are looking to migrate traditional standalone 'silos' of applications—each requiring its own platform, management and network integration—to multi-service, extensible platforms that share middleware and integrate efficiently with any combination of IP transport network domains, as illustrated in Chart 3.



CHART 3. DNS can enable software APIs and middleware for multiple network applications to improve efficiency



Source: Strategy Analytics Wireless Networks and Platforms



By integrating multiple services on high-performance, distributed, scalable platforms like DNS, CSPs can now achieve increased security and significant OPEX savings as they simultaneously enhance subscriber value with new service applications on top of the DNS utility network elements.

DNS versus other service-enabling platforms

DNS has several specific advantages when used as the foundation for a software environment for network-related services including:

- **Well-specified interfaces** to all the relevant elements of the communications network infrastructure including:
 - *Policy Rules (PCRF)*
 - *Billing System (OCS)*
 - *User Profile (SPR/HSS)*
 - *Digital Marketing System*
- **Visibility of all end-user traffic activity** worldwide without interrupting the traffic flow
- **Real time application request monitoring** for improved insight
- **IP network resource** information to identify available network resources
- **APIs and middleware** to support and create new services with extensive analytics
- **Multiple service use cases** in operation

DNS platforms are uniquely positioned in the network to monitor activity and resource requests, or to add value in mid-flow/session without degrading the user's round trip response time.

In Chart 4, we compare Nominum's approach with more traditional approaches for delivering similar functionality, demonstrating that DNS-based solutions offer a new, innovative approach compared to traditional DPI and cloud solutions.

DNS platforms are uniquely positioned in the network to monitor activity and resource requests.



CHART 4. Comparison of DNS, DPI and Cloud OTT

Technical Approach	Nominum's Unique DNS-based Services	DPI/Traffic Classification	Cloud OTT
A. Session and Flow Characterization	Network-control-plane-based monitoring of all requests in all flows	Intercepts in data plane of headers, session information and application interrupts required	Unavailable to CSP—Visible by OTT and cloud providers that monitor sessions end-to-end (E2E)
B. Network Platform Integration	Integrated with DNS as part of IP infrastructure	Typically implemented on separate platform for HTTP Proxy or Layer 4-7 traffic classifier based on headers, application type, etc.	Terminal/client download from host/server resource at data center
C. Implementation Across Access Technologies	Exists in IP network, regardless of network access type: cable, fixed-line or mobile	User traffic classification and session monitoring varies on each type of network	Access-neutral at remote data center
D. Hardware/ Processing Needed	Sits on top of existing high-performance DNS platform for millisecond response	Separate high-performance processors required to minimize latency in processing user content	Leverages existing server processing at data center for response in seconds
E. Customer Experience Management (CEM)	Simultaneous, real time visibility of application requests and network 'hits' allows proactive CEM	Separate processes 'after the fact' are required to correlate poor CEM and network performance issues	Service assurance not feasible unless data center coordinates with the operator
F. Policy Management	User-specific policy rules enforced in real time (PCEF). Only syncs with PCRF for new rules.	Accesses HSS/ subscriber data repository and PCRF across the network for user-specific rules	Policies in the network are not accessible at OTT data center—so apps must be associated separately with CSP policy



Nominum leverages DNS to deliver differentiated digital value

Nominum leverages key technology differentiators to create enhanced digital value for CSPs and their customers in four ways:

Converged solutions enable subscribers to enjoy the same experience regardless of the device or network — whether wireless, Wi-Fi, cable, DSL or fiber.

1. Accelerated customer control and responsiveness that allows:

- CSPs and subscribers to get real time control over services
- Families to change and configure filters to fit their content preferences that are activated instantly
- Continuous, cloud-based updates of policies and lists by the CSP

2. Integrated IP service management that lets operations teams:

- Manage one platform built on highly robust and scalable IP infrastructure
- Support many services with common, unified interfaces for monitoring and provisioning

3. Converged solutions that enable subscribers to enjoy the same experience regardless of the network or device they are currently using — whether:

- Wireless, Wi-Fi, cable, DSL or fiber
- Smartphone, tablet, e-reader, wearable, laptop or PC

4. Personalized user access and engagement so that households can:

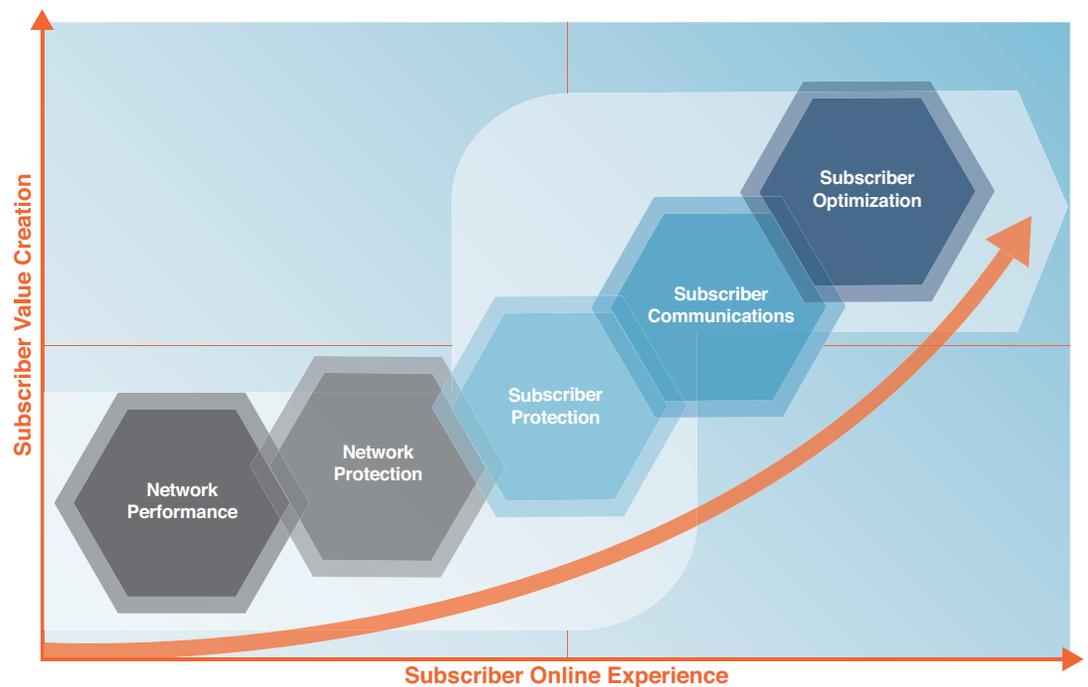
- Express their preferences and values
- Create their own unique 'view' of the Internet
- Customize settings for every device in the home



4. NOMINUM: UNIQUELY POSITIONED TO ACCELERATE DIGITAL TRANSFORMATION

Nominum is the only vendor focusing on a DNS-based software environment for value-added services at this time. Long used for high availability and security on websites, DNS infrastructure is now being leveraged by CSPs for subscriber-focused services. Nominum applications leverage its Vantio CacheServe DNS software to create an extensible set of functional elements that deliver increasing value, enabling CSPs to demonstrate service agility and rapid activation.

CHART 5. **Nominum accelerates CSPs up the digital transformation curve**



Source: Nominum

CSPs are digitally transforming their business by leveraging existing DNS network infrastructure.



Technology benefits differentiate Nominum

The technology behind Nominum services is a major reason for the performance and control capabilities they deliver to users. Chart 6 summarizes the technology differentiators and their benefits.

CHART 6. **User and service provider benefits delivered by Nominum’s unique technology**

Unique Nominum Technology Differentiators	Key Benefits to Users	Key Benefits to Service Providers
A. Network-control-plane-based services	Instant response to user requests	No interference with user data or content. Makes automated service activation easy.
B. IP infrastructure-based	Extensible functionality without user downloads	No additional ‘box’ in the network. Leverages existing CAPEX, improves ROI.
C. Independent of cable, fixed or mobile access	Seamless, multi-device service	Increased stickiness that leverages all-IP network and moves towards fixed mobile convergence
D. No new heavy duty processing platform required	Minimal latency introduced for new, value-added capabilities	No additional platform to manage. Services can be added and extended in minutes.
E. Simultaneous visibility of application/domain name requests and network resource (IP address) 'hits'	Better customer performance and fewer network problems	Operations centers can instantly see problems and detect which customers are affected to preempt poor customer experiences
F. Policy rules enforced in real time (central policy sync for new rules only as needed)	Unique personalization without slower response time	Millions of policies implemented instantly on a per-subscriber basis
G. Embedded real time analytics for every event	No performance impact from analytics	No need to turn logging on and off to capture user applications activity or track service use

Source: Strategy Analytics, *Wireless Networks and Platforms*



Nominum delivers the digital transformation capabilities CSPs desire

Comparing the desired capabilities described earlier in the UXP Systems survey with the functionality provided by Nominum, there is an excellent fit between the desired capabilities and Nominum’s service portfolio. Chart 7 maps each one to the user and service provider benefits Nominum delivers for those desired capabilities.

CHART 7. Nominum platform and applications deliver top seven operator capabilities

Top Seven Capabilities	Key Benefits to Users	Key Benefits to Service Providers
1. Simplifying the way users onboard to services and manage their services digitally	Simple-to-use service activation and control	Customer satisfaction increases customer loyalty
2. Capturing user-level interaction data for every individual user of services	Personalized service and support	Better analytics for more effective service offerings
3. Being able to give each user specific privileges, preferences and access	Personalized profiles that are always up-to-date without a separate Internet session	Back-office functions are automatically in sync with network at reduced cost
4. Personalizing self-care, access and service experience for every individual	Users manage own services with instant self care	Reduced service management costs and increased customer satisfaction
5. Having a one-to-one relationship with every user that consumes an operator service	Perceived operator responsiveness	Closer relationship and feedback from customers
6. Merging siloed users across different billing, care and service systems	Seamless care across services	Automatic, integrated view of customers
7. Enabling users to self-manage groups, sub-users and profiles	Customer control of family users	Expands business and accelerates service growth

Source: Modified from UXP Systems with Benefit Analysis by Strategy Analytics.



CSPs can leverage Nominim's inherent platform ability to respond to customer application requests in real time and simultaneously capture a network view for agile service delivery.

The Nominim platform is automatically extensible and scalable at minimal cost for new instances of existing services or the addition of new, real time subscriber communications and protection services. As they grow, these DNS-based services can easily add new functionality into the service flow without increasing latency, since they operate 'in line' with the flow of applications and resource requests already running across the Internet. DPI intercept-based applications operating in the data forwarding plane are likely to have significantly more impact on end-to-end user performance.

CSPs can therefore leverage Nominim's inherent platform ability to respond to customer application requests in real time and simultaneously capture a network view for 'agile service delivery' that will allow them to:

- Ensure subscriber safety
- Increase interaction with subscribers
- Enhance customer loyalty with greater provider interaction
- Respond to user networking needs and requests in real time

These services can guarantee very fast insertion, alerting, response generation and delivery times, e.g. for parental control activation, that are far superior to traditional back office administrative implementations, or even to most cloud-based client/server applications.



5. USE CASES THAT MAXIMIZE CUSTOMER VALUE

The Nominum application suite offers over 70 use cases that align to six major organizational functions in a CSP organization. Chart 8 shows these functions. The application suite is also configurable, with extensible variations available to deliver new value propositions for a wide and growing range of use cases.

CHART 8. **The Nominum application suite is designed for six functional areas**

Nominum’s expertise in data science, decision rules and analytics plays a key role in designing these systems and software that deliver flexible, extensible options for configurable services.



The flexibility of the Nominum service platform allows rapid development of new applications—or the modification of existing ones—so that agile CSPs can create their own combinations of unique value for their subscribers. Nominum’s expertise in data science, decision rules and analytics plays a key role in designing these systems and software that deliver flexible, extensible options for configurable services.

Multiple examples of use cases for each of the six functional areas are shown on the next page.



Use cases supported by Nominum

CYBERSECURITY DEFENSE USE CASES	
1	Protect your network Prevent DNS-based DDoS attacks and block malicious Internet bot activity that can cause network outages and deteriorated service.
2	Shield household networks Infected subscribers are 3.6 times more likely to switch service providers. Safeguard home networks from malicious online activity to retain subscribers and inspire brand loyalty.
3	Protect subscriber devices Infected subscribers are 8 times more likely to contact the call center. Safeguard subscriber devices from threats like phishing, malware, ransomware, online scams and fake anti-virus products.
4	Prevent bandwidth theft Prevent theft of service caused by hackers using DNS tunnels on cellular and Wi-Fi networks.
5	Protect households from illegal content Prevent accidental navigation to websites that host illegal content.

VALUE-ADDED SERVICES USE CASES	
1	Protect subscribers from cyberthreats Enhance basic online services with advanced cybersecurity protection to increase subscriber loyalty and reduce churn.
2	Enable subscriber-defined content control Allow subscribers to block access to sites they consider offensive and potentially harmful.
3	Provide parental controls and monitoring Manage online access with precision policy control at multiple levels: household, individual subscribers and unique devices. No software downloads are required.
4	Protect children online Safeguard children from inappropriate content with parental controls that enforce safe searches on all or selected devices.



CUSTOMER EXPERIENCE MANAGEMENT USE CASES

1	Subscriber onboarding experience Familiarize subscribers with new services to create a positive onboarding experience.
2	Agile service personalization Allow subscribers to customize their online settings in real time to reflect personal preferences and values.
3	Security recommendations Use trusted messages to present subscribers with online security guidance.
4	Infected subscriber alerts Send trusted messages to immediately alert subscribers of infections and malicious activity.
5	Infection remediation instructions Provide subscribers with instructions on how to remediate security infections and direct them to online tools.
6	Conduct and promote online surveys Publish online surveys to targeted subscribers.
7	Service appointment reminders Remind subscribers of upcoming service appointments to enhance relationship-building and brand loyalty.

MARKETING AND PROMOTIONS USE CASES

1	Cross-sell, upsell and bundle Promote new services with powerful messaging capabilities that align with subscriber behaviors and preferences. Generate conversion rates that are up to 10 times higher than email.
2	Data usage alerts Alert subscribers at predefined data usage thresholds to help manage customer spend and inspire loyalty.
3	Service plan upgrades Earn up to 20% more revenue by offering premium services and data plan upgrades at the time of need.
4	Wi-Fi hotspot monetization Generate revenue while satisfying consumer demand for free Wi-Fi access.
5	On-demand video specials Promote paid content and on-demand video services.
6	Pay-per-view promotion Launch context-aware promotions for premium entertainment services when subscribers are most likely to buy.
7	Third-party promotions Open new revenue streams by presenting offers from authorized partners.



BILLING AND REVENUE MANAGEMENT USE CASES

- 1 Payment alerts**
Improve accounts receivable performance metrics by increasing the number of customers who pay on time.
- 2 Past due reminders**
Recover past due accounts with a series of progressively urgent messages, each with a click-through to a payment portal.
- 3 Promote paperless billing**
Reduce operational costs by getting more customers to choose paperless billing.
- 4 Promote auto pay**
Encourage customers to enroll in an automatic payment plan.
- 5 Third-party billing**
Open new revenue streams by assisting authorized partners with bill collection.

LEGAL AND REGULATORY COMPLIANCE USE CASES

- 1 Security breach notifications**
Alert subscribers when they become infected with malware known to compromise personally identifiable information.
- 2 Copyright violation alerts**
Warn subscribers when attempting to access websites that host copyrighted content for illegal download.
- 3 Terms of service notifications**
Inform subscribers of important service policies and direct them to policy documentation resources.
- 4 Policy update notifications**
Notify subscribers of material changes to service policies.
- 5 Privacy notices**
Inform subscribers about the collection and use of personally identifiable information.
- 6 Content compliance**
Block prohibited online content in accordance with local mandates.



6. CSPs GAIN FROM DIGITAL TRANSFORMATION

Nominum's DNS-enabled approach supports extensible, low-latency services that focus on high-performance services such as security, browser message insertion and user-controlled service access which is provisioned and modified rapidly. All Nominum solutions can embed intelligent data capture for real time analytics that integrate easily with policy management to create user-unique profiles and deliver personalized service in real time, without loss of performance.

Nominum service families therefore deliver to service providers important gains from digital transformation:

- **Intimate understanding of users**
- **Greater customer loyalty**
- **Response to user needs in real time**
- **Service differentiation**
- **Smarter real time services**

These gains translate directly to:

- **Lower OPEX per subscriber**
- **Better security management**
- **Reduced calls to customer care**

And better customer experience translates to:

- **Lower churn**
- **Improved profitability**



7. CONTACTS

Nominum

To explore this topic in more detail or to hear how Nominum can support your digital transformation initiatives, please call +1 (650) 381-6000 or email: contact.us@nominum.com

Nominum is the world's DNS innovation leader and the first company to create an integrated suite of applications powered by DNS to increase subscriber value and protect networks from cyberthreats. Leading providers in over 40 countries use Nominum software to protect their networks and promote greater value to more than 500 million subscribers.

Strategy Analytics

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