

Pay Per SaaS as an IPv6 App

<http://shoumendatta.wordpress.com/>

Profit from IPv6 enabled Pay-Per-SaaS to reduce Transaction Cost

Financial agility may be the key to profitability if [a] the market can only bear small costs and [b] dynamic systems are deployed to combine economies of scale with pay per transaction. This age-old idea may be the staple for billing and payment for mobile SaaS (software as a service). Business analytics may offer additional sources of revenue for software analytics and services (SAAS) as a part of SaaS. In combination, SaaS and its subset SAAS, may serve a vast array of verticals including traditional B2B edge services, energy efficiency, streaming entertainment, online education, retail networks, supply chain operations, logistics, transportation, security, equipment monitoring, insurance industry and remote healthcare monitoring (<http://esd.mit.edu/wps/2008/esd-wp-2008-17.pdf>).

From a historical perspective, the POTS (telephone) billing system (pay per call) and metered usage of utilities (electricity, gas, water) are familiar examples of user identification coupled billing. In the post-internet era, there is a growing anathema toward fixed payments and block charges, eg, basic "blanket" service charge or connection fee. The recent outburst due to changes made by Netflix is one of many examples. Netflix missed the opportunity to pioneer new methods of payment for its instant streaming-on-demand (iSOD) and gobsnacked the market by instituting a fixed cost for DVD-by-snail-mail (DBSM) only to better establish RedBox in the DVD market (however, all advantages are temporary). Netflix could have usurped the pay-as-you-go scheme (which epitomized the mobile phone industry) for its DVD business or could have taken a page from Amazon's Web Services (AWS) success story (<http://news.yahoo.com/amazons-next-billion-dollar-business-eyed-015605726.html>).

In a related vein, the introduction of mini-packaging for toothpaste (in India) stands out as an example of marketing innovation which combined the concepts of economies of scale with pay per transaction, to a limited extent. According to the World Bank (2005), 75% of the population in India may still live on less than \$2 a day (by purchasing power parity). The Government of India indicates about 40% of the population may be below the international poverty line (\$1.25 per day). Therefore, purchasing toothpaste in a standard (US) 175 g pack (6.2 oz) at a cost of about \$4.49 may be a rare luxury when the national per capita income (India, 2010-11) is \$1200 per annum, approximately. The vendor considered the scale of the market as well as the cost it can bear on a "luxury" good, ie, toothpaste in a tube. The pack size was reduced to 17 g (0.6 oz) and priced at \$ 0.50 or about 20 Rupees (INR). The exponential increase in the volume of toothpaste sales in the mass market of more than 1.1 billion is an indication of the potential for profit which may be extracted by combining a systems approach with scale and micro-payments to reduce barriers to market entry in any economy, emerging or not.

Hence, selling software licenses for fixed payment seems archaic yet it has predominated the industry only to exclude or limit the spectrum of customers (for example, SAP sales in the SME segment). Mobility and portability of services (SaaS and SAAS) has improved (for example, Microsoft Dynamics) but yesterday's payment model still appears to be the norm. Mobility of applications in the hand of the end user as well as near real-time B2B analytics and SaaS requires granularity of documenting events and billing for instances of use. The micro-payment stream, based on instances of actual usage, may be far greater in volume and profit, compared to fixed cost structures (however segmented or tiered) for SaaS or SAAS.

Business and individual customers of the very near future will create market demand for SAAS•SaaS but neither may pay for fixed price contracts. One key to profitability may be rooted in the fundamental feature of the service. In other words, SaaS type of services are (a) acquiring and (b) analyzing data in the "cloud" followed by (c) delivering the output. This sequence may be segmented into telecommunications services and computing (storage included) services. The cost of data volume can be precisely billed using volume of packets delivered/exchanged. Associated IPv6 provides the unique id of the user. In this scenario, the user only pays for the precise data/information volume carried by the medium (telco). The data processing function consumes CPU (cloud-grid) which can be metered and billed as two components: user CPU time is the time to execute the instructions of the program and the system CPU time is the time used by the operating system to run the program. These elements in CPU time consumed (billed) are the products of instruction count \times cycles per instruction (CPI) \times clock cycle time. Hence, users pay for the actual computing power (CPU time and relevant storage capacity, referred to as CPUS) they have used to process the data and extract the information for the type of output they desire from their SAAS•SaaS provider.

For example, Spar, a small retail chain trying to optimize its inventory and delivery window may choose to use a traditional algorithm (low instruction count) based on CLRM (classical linear regression model). It may draw data buckets from only 50 retail stores and 3 distribution centers. On the other hand, Whole Food Markets (<http://gawker.com/5824287/read-a-disgruntled-whole-foods-employees-epic-resignation-letter>) with its vast operation in North America may demand greater accuracy about the ETA (estimated time of arrival) of its delivery trucks in distribution nodes and transparency of its perishable goods in transit to optimize its dynamic cross-docking operation to meet store level demand vs inventory. WFM's precision may require data from telematics systems such as GE VeriWise. In addition, it may require in-network processing powered by cloud-grid based analytics. WFM may opt to process its data stream using multiple algorithms based on different combinations of analytical engines which may include CLRM as well as other high instruction count algorithm based on the econometric technique of generalized autoregressive conditional heteroskedasticity (GARCH) coupled with VAR or vector autoregression (<http://esd.mit.edu/wps/esd-wp-2006-11.pdf>).

Therefore, the SAAS•SaaS provider running multiple levels of analytical framework in its cloud will process the output for Spar and WFM in a manner which consumes different CPUS. It is prudent, then, to charge the customer for levels of services they have used, rather than a flat fee or fixed contracted rate or overhead. It may be appropriate at this juncture to offer a name (in this context) for the traditional practice of service differentiation. I propose the cloud-grid based iDDE (intelligent differential decisioning engine). Cloud and grid hosted differential decision support engines are expected to auto-deploy based on service levels or options chosen by customer or the data granularity from connected nodes or objects (for example, customer specific internet-of-things [IoT] for visibility of objects in the transportation industry or third party logistics related IoT). The analytical repertoire (engines or logic layers) may range from static hard-coded workflow sets (low instruction set, hence, less CPUS charge) to artificial neural net (ANN) driven learning algorithms with dynamic back propagation to optimize the output preferred by the customer or ANN optimized sets in fuzzy logic applications. Differentiation of the service is driven by customer's desired level of SAAS•SaaS decision support or AI-agent based actions. The customer pays for as little or as much she chooses to invest and can dial-up or dial-down (DUDD) from the menu of services without having to change service providers if advanced analytical services are desired, occasionally.

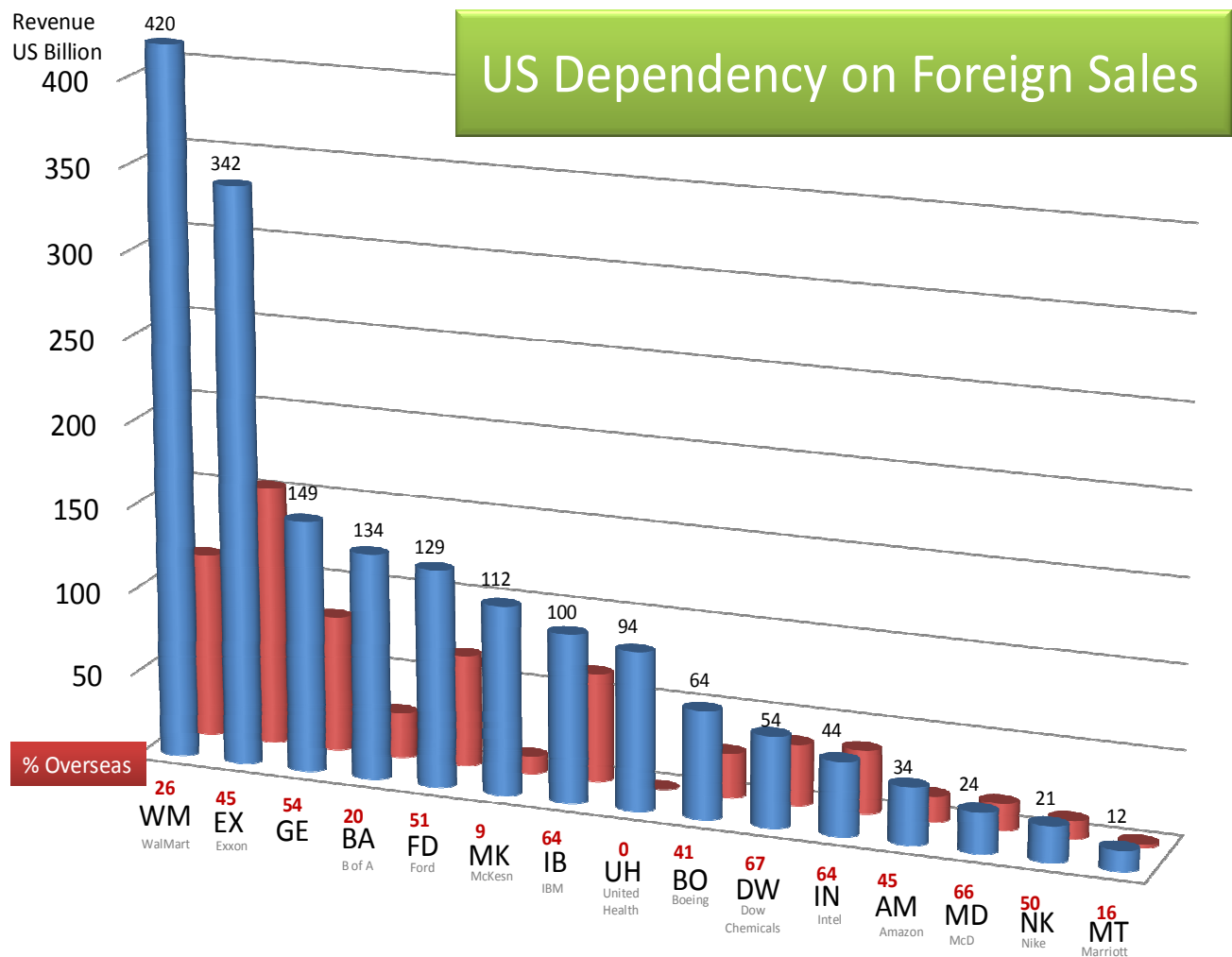
Pay-per-CPUTS strategy may use idle computing resources of the business in question using grid infrastructure to farm out the processing within the business using IaaS (infrastructure-as-a-service). It may include cloud and grid computing(www.ibm.com/developerworks/web/library/wa-cloudgrid/). By combining internal and external resources via the grid and the cloud, SaaS providers may maintain a greater elasticity of their cloud (for example, Amazon's EC2) and better accommodate peak computation demands while allowing customers to use unused computing assets. It may be fashionable to introduce a new name for the evolving cloud and grid combinatorial IaaS. Let me use this blog to introduce CLOG (and volunteer a pun for our critics).

CLOG providers, such as Amazon, may use open architectures (for example, OGSA and Globus Tool Kit) to harvest-on-demand (HOD) idle computing resources from corporations. For example, the idle processing power in mostly unused but powerful Pentium chips inside the thousands of check-out computers in thousands of Wal*Mart stores. The mechanism may be analogous to EnerNOC's energy demand response operation. EnerNOC's energy efficiency services help utility providers manage peak demand by "procuring" power through temporary reduction of consumption by its corporate members (rather than asking individual users to conserve during peak demand due to heat-wave or super-freeze).

Taken together, flex pay strategies enable small businesses (for example, Stirling Sports of New Zealand) and behemoths like Wal*Mart to subscribe to the same SAAS•SaaS provider capable of dynamic differentiation of service and the cost of service delivered. This granularity of billing (CPUTS) and unique identification (IPv6) allows accuracy of billing by instances of usage. Hence, users may dial-up or dial-down their SAAS•SaaS needs.

For example, in certain cases, WFM may choose to be satisfied with using CLRM and pay less for that specific instance (for example, when reducing inventory carrying cost for non-perishable dry goods, such as, pasta). Because of this granularity and the dynamic menu of services, there aren't any financial "barriers" to market entry in the pay-per-SaaS business model. Hence, instantly, the world is the global market for SAAS•SaaS.

Prior to the development and adoption of the IPv6 standard, we did not have robust tools to capture granular usage instances or cycles of operation and link their unique id to the id of the specific user. Now we do. It changes the game, eliminates the need for fixed service costs and instantly presents global markets of unprecedented scale. In other words, the world market is open for business, unique id is at hand and the billing tool is ready. Bring on the services, unleash SAAS (B2B) and deliver the SaaS (B2C).



<http://money.usnews.com/money/business-economy/slideshows/how-15-us-firms-depend-on-foreign-sales/17>

A mechanism to use the IPv6 format in this context was proposed about 5 years ago (<http://esd.mit.edu/wps/2007/esd-wp-2007-17.pdf>). It also provided a framework for unique identification for IoT (Internet of Things) and their interaction with humans. The proposal advocates utilization of IPv6 to uniquely identify not only things (objects in IoT) but also processes, relationships (syntax, semantics) and interfaces (sensors). This suggestion draws on a confluence of ideas which may augment systems interoperability, transparency and build intelligence in forecasting for operations attempting to anticipate uncertainties or navigate in a volatile global economy.

Convergence of *identification with information* using the 128-bit IPv6 structure offers 3.4×10^{38} unique instances. It is not necessary that all instances must be connected to the internet or routed or transmitted simply because an IP addressing scheme is suggested. This is a potential alphanumeric **framework** or *structure* of infrastructure which may be necessary for identification to (a) improve revenue potential from data routing (for example, P2P packet tracking), (b) use in remote healthcare monitoring, (c) explore the scope of its use in the semantic web by transitioning URIs used in RDF, (d) manage applications involving thousands of mobile *ad hoc* sensors (MANET) that transmit data and may demand dynamic adaptive auto-reconfiguration (pervasive mesh networks, location-aware ubiquitous in-network processing/computing, security).

Data (bits) from unique identification of objects or things (atoms) are often helpful to the decision making process. Decisions, however, are often based on information that takes into account multiple factors. Physical objects and their unique identification may be one of many factors, as is the internet of things (IoT), from the perspective of a systems approach. Real-world decisions are often based on collective information gathered from multiple sources (or systems) that includes data (bits) about “things” (atoms) and processes associated with “things” which may be used in combination with a higher level domain that may eventually trigger a decision or execute an action, aided or unaided by a human. Currently, we do not have a globally unique mechanism to identify *information* derived from data originating from things (objects) *and* processes.

Unique identification of information, hence, is still an open question. Software driven intelligent solutions from the latter are likely to be in demand in B2B, B2C, P2P, D2D and O2O embedded decision support systems. It is not difficult to predict that software and analytics based business services (in the context of existing business verticals) are an attractive source of new revenue from entrepreneurial innovation (SaaS/SAAS).

Vendors (SaaS provider) cannot profit from the dynamic consumption of its services (SaaS/SAAS) unless the information (data, voice, video) arbitrage is documented at every instance while streaming or exchanged between nodes (broadcaster, user) through the medium of delivery (cable, 4G, 802.16m). It is in this context the application of the proposed IPv6 format as an unique id for every instance is of immense financial value, if the tools (CPUTS) are implemented to capture and log the events.

IPv6 can assign unique id to packets and since packet switching is increasingly the predominant mode of data transmission, it reasons, therefore, that IPv6 may be the Holy Grail to profitability for SaaS providers and the vendor controlling the medium of delivery (cable, 4G, 802.16m) essential for access to the user (please see related article Paradigms Driven By Paradoxes <http://dspace.mit.edu/handle/1721.1/62251>).

For information, to be of value, it must be **relative** to the context of the process. In general, contextual information is of greater relevance in the B2B decision making process or in any decision support system. Since information is key, one who holds information can use data, for profit, as a pay-per-use or pay-per-access service. Transmission of data is essentially the domain of routers. Routing data is an ubiquitous and essential function (real-time data, supply chain, logistics, emergency, medical results, networked entertainment, video-on-demand, energy-use optimization) performed by products in boxes (for example, routers). Corporations are likely to explore new revenue streams simply from use of raw data, for example, data-as-a-service (DaaS) or how to profit from data routing by providing access to data (pay-per-use hosted services). The next level and higher revenue originates from processed data or in-network processing of information-as-a-service (iaaS).

Transformation of data into information is difficult due to the inability of systems and software to comprehend or understand. Advances in systems interoperability, adoption of sophisticated analytical techniques for forecasting and risk analysis as well as the anticipated growth of the semantic web infrastructure may stimulate in-network processing of data to boost iaaS business model as a sub-layer within SaaS and SAAS by making sense of data and information relative to each other.

These are new sources of revenue emerging from functions massive in scale but still poorly metered due to inadequate ability to document and charge for individual events and instances. The identification and identity infrastructure necessary for a scale so massive calls for a system that is able to uniquely identify and assign identity to objects, process and decision layers. My proposal, albeit imperfect and hypothetical, explores the potential use of IPv6 or an IPv6 type format for this task. You may download the paper from <http://esd.mit.edu/wps/2007/esd-wp-2007-17.pdf>

mobile eVote (meVote) as an IPv6 app

Sampling public opinion is an important component in politics. Predicting potential for success or forecasting failures could influence the content, criteria and clarity of the policy in question. Product marketing, taste testing and social acceptance are integral elements in the business world which may also benefit from reliable and relevant public opinion data. The ability to obtain real-time opinion polls from individual contributors in a manner that is identity-protected, verifiable and reliable, may change the nature of the public participation in governance, legislation and decision metrics.

The value of an e-polling mechanism increases exponentially if the system is refractive to electronic vandalism and can be reasonably trusted to deliver authentic user experience or opinion with minimal scope for data manipulation, such as, duplication, phantom voting, identity falsification or misrepresentation. Security ¹ is a key measure of success of public e-voting systems ² while user friendly technology ³ may determine the business use and adoption of opinion polling data acquisition tools. Confirming mobile identity was not possible (for data packets) using IPv4 addressing schema. IPv6 and its vast scope to assign unique individual numbers ⁴ lends itself as a mechanism to deliver an innovative system, meVote.



Connect the Dots

Mobile eVote operates as an IPv6 app to deliver real-time opinion polls which are uniquely identifiable (meVote) and verifiable for security.

¹ www.cs.ucsb.edu/~seclab/projects/voting/issta08_voting.pdf

² www.cs.ucsb.edu/~seclab/projects/voting/evotespec.pdf

³ www.pciopro.com/audience-polling-technology/

⁴ <http://esd.mit.edu/wps/2007/esd-wp-2007-17.pdf>

How do you know that it is really I who voted using meVote?

Certain assumptions and adoptions are necessary to uniquely identify the origin of meVote. IPv6 is a global standard which is in operation or will commence operation from June 1, 2011 wherever networks operate. All mobile devices, such as a cell phones, may have an unique IPv6 number. In combination with other alphanumeric identifiers (for example, social security number, date of birth or zip code) the IPv6 device identifier can be linked to the user and registered on meVote website. This database allows the unique id of an individual anywhere in the world to use her/his registered mobile device to cast a meVote for an authenticated purpose (for example, US citizens cannot activate meVote to vote in the French Presidential election). Date and time stamp in combination with "open" duration of poll will allow only one submission with unique id linked to one individual. If using a browser, the answers may be accepted using a simple code entry system which links the registered unique id of the mobile device to the user (used commonly by banks for transactions). Data entry in the meVote system may be dependent on the system activating the transmission of an entry code to the mobile device which to be entered in the meVote browser for data to be accepted as a valid vote by the user.

How do I know what to vote for or when an issue or referendum is presented for a vote or poll?

www.meVote.com offers a menu (see example below) of categories, sub-categories and sub-units to which you shall subscribe either directly or through any social network (Facebook, LinkedIn) or email account (Gmail, Hotmail) or IM (Yahoo, Buzz) which you may frequently use, locally and globally. When a registered entity (for example, The White House) uploads a question or solicits opinions (which may be directed at specific individuals per profile or selected by zip code for national polls or queries aimed at Congressional districts) then a text message alerts you to the new posting (according to your registered categories). You can use the mobile device to respond or use any browser to log on to meVote to voice your opinion. Cell phone number pads may suffice to send responses which may be as simple as choosing numbers from 1 to 5 in order to transmit the opinion in a manner similar to online surveys, for example, (5) strongly agree; (4) agree; (3) not applicable; (2) disagree; (1) strongly disagree).

Retail

- Fashion
 - Women's
 - Men's
- Grocery
- Restaurants

Politics

- National
 - Republican Party
 - Democratic Party
 - White House
 - Congress
 - Senate
 - CDC
 - Tax
- State
 - Education
 - Infrastructure
- City
 - School Board
 - Utilities
 - Garbage

Entertainment

- Movies
- Sports, Music, News
- TV

Healthcare

meVote Fictional Scenario (Hypothetical)

Angela Brooks visits www.meVote.com and registers to participate in education issues <> Politics > City > School Board. She lives at 40 Brattle Street (Cambridge, MA 02138) but registered for the cities of Cambridge, Newton and Milton (where she went to school). The City of Boston visits meVote to register as an authenticated polling entity in the category Politics > City. In pursuit of excellence, Governor Deval Patrick requests Mayor John Menino to find a way to encourage the local academic institutions in Cambridge (MA) to engage high school students from Boston Latin School in summer research. Both institutions cite under-age of BLS students as a barrier to acceptance for research programs. Gov Patrick persuades Presidents Hockfield and Faust to revisit the issue by enabling a poll of residents, faculty members and graduate students to share their perspective. The law firm of Ropes & Gray was retained as an uninvolved party. They designated Anna de Leo to formulate a couple simple questions and upload them through the City of Boston authenticated user id under the category Politics > City > School Board > Cambridge and select zip 02138 and 02139 for responses.

Angela Brooks is in Venice to attend her friend's wedding. She went to school with Nancy Poon from Boston Latin School. Angela is walking down Campo San Maurizio when her HTC 4G phone throngs. She searches for her phone in her purse while walking through Calle del Piovan by the front of the church where Nancy will be marrying Michael Mastropasqua, few hours later. She finds the phone and finds a blinking "pen-in-hand" symbol she chose to personalize her meVote alert. Ironic, she reflects, as she looks up, a few steps away on the right is one of the unique and most original stores in Venice, *Il Papiro*, famed for superb stationery, unique marbled paper and leather-bound journals. It is a paradise for those who love to write by hand and she was finding her way to the store to buy a gift for Nancy and Michael's wedding. She stops outside the store and goes to meVote. As a registered user residing in zip code 02138 (location criteria selected and specified by the user) and Harvard alum she is doubly qualified to cast her vote in this opinion poll (although she is not a faculty or current graduate student). She chooses 5 (strongly agree) to support BLS summer research.

Ropes & Gray delivered the results (72% affirmative, 20% abstention, 8% negative) of the poll the following day. Both institutions found that alums and residents in zip 02138 and 02139 where supportive of high school students engaging in academic labs to conduct summer research. Diplomacy and meVote technology converged to help the students find more than one [reason to aspire](http://shoumendatta.wordpress.com/2011/05/31/a-reason-to-believe/) (<http://shoumendatta.wordpress.com/2011/05/31/a-reason-to-believe/>).