The Economic and Business Impact of the New IP: Initial Findings

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The impact of the New IP and the Internet of Things on US firms and the US economy will be substantial. Initial conclusions from this analysis suggest that New IP technologies, such as virtualization, software defined data centers, cloud computing and containers, and the Internet of Things have become mission-critical for many enterprises. Firms in sectors such as finance, autos, aviation, computing, semiconductors, and media, are building significant core business operations on these technologies. In the next few years, quite a number, if not a majority, of firms in other industries such as healthcare and pharmaceuticals as well as government will begin to leverage these technologies. As a consequence, corporate profits and revenue growth are beginning to depend on agile and open computing, data and networking infrastructure. US economic growth should also benefit.

Initial discussions indicate that firms are likely to take the following steps to implement these technologies:

- First, they will need to expand into open computing and storage infrastructure and build ways to incorporate open networking into these systems. This will provide new capabilities, such as the opportunity to combine computing and storage resources across the Internet in a secure way.
- Second, firms will need to build specialized teams to insure they have the competencies and skills to insure success with these technologies. Ford, Goldman Sachs, Gap, Facebook, and Netflix have already begun such effort.
- Third, firms will demand greater expertise in data analytics to optimize the improvements in corporate decision-making that this group of new technologies offers. This is resulting in two trends. In one, firms are moving occupations that were once very narrowly defined, such as software development, into a team structure. As a result, firms are grouping several different occupations involved with application development or data analytics work into collaborative teams. The other trend, closely related to the first one, is that many firms now require employees in entry-level jobs to have more experience with the software and tools needed to operate in the transformed environment these new technologies create.
- Fourth, because of the huge demand for qualified personnel possessing such skills and a shortage of skilled workers, firms are beginning to use innovative training to help existing and new employees gain many of the skills needed to work efficiently in the new collaborative teams that support the New IP and Internet of Things.

Little of the present US digital infrastructure was created to support the demands of the New IP and Internet of Things. Software defined infrastructure for computing and storage requires very low latency for data access and transmission. Many institutions are being pressured by the huge increase in data they needed to handle. This surge of data is coming from the Internet of Things and the increased number of devices attached to today's digital infrastructure. Such increases in data use will continue to strain the current digital infrastructure and force a good deal of analytic
and storage capabilities to move to the periphery of networks. These two trends will demand a sizeable investment if new systems based on the New IP are to be rapidly and successfully deployed. Unless our current digital infrastructure is improved, commercial innovations, such as systems of driverless cars and wearable devices for healthcare monitoring, may find that successful adoption is hamstrung or shortchanged.

Thus, the New IP and Internet of Things are likely to transform businesses, stimulate the development of a more complex digital infrastructure and create new types of jobs. It will have this impact as the digital or “gig economy” evolves over the coming decades.

I expect the most important impacts of the New IP will be:

1. Promoting a higher level of economic growth.
   
   a. Initial evidence from this analysis suggests that the New IP and Internet of Things will transform how businesses, consumers and government use digital technology. Uber, Facebook, Netflix, and Gap are just a few of the businesses using these technologies to transform markets. The adoption of the digital technologies studied here is likely to expand revenues and growth in many industries. It also has the potential to disrupt some sectors where these digital technologies have not yet reshaped operations, such as healthcare and pharmaceuticals.

   Changes in these sectors will vastly improve productivity, offer dramatic cost savings, and provide broad opportunities for business expansion. Given these changes, which we see in a microcosm of firms in today’s economy, we believe that US economic growth will outstrip current expectations and rise to an average annual rate of roughly 2.5% or more over the next 5 years. This differs sharply from forecasts of slowing economic growth. This is because a number of longer-term economic forecasts assume that there will little or no innovation in the future. If there is a digital-based revolution in infrastructure, the prediction of slow growth is reversed.

2. Substantial savings from implementing significant changes in infrastructure, software and platforms.

   a. Cost savings and opportunities to expand revenues have been at least $5 billion to $12 billion over the past three to five years. If the New IP and Internet of Things is adopted by the Fortune 500, we estimate that the savings would be $39 billion to $163 billion over each of the coming years. Cost savings of this size will most likely affect the corporate profits.
3. A significant improvement in productivity.

   a. Our preliminary research indicates that US productivity growth could reach a level of about 2.5% annually compared to the current 1.5% to 2%. It might even trend higher if the benefits of the New IP and Internet of Things are adopted in other parts of the economy. We have identified some firms where recent productivity gains have increased by about 30 percent per year. If we attribute about two-thirds of this to software and network platforms and tools and the remainder to labor productivity gains, then the contribution of software to annual productivity growth rises to 0.20 to 0.25 and accounts for about 10% or more of annual productivity growth. If the enhancement to software value is included in integrated multi-factor productivity, we expect that this could raise this productivity measure to an average annual growth rate of 0.70 to 0.90 (from present levels that are about half this much) and account for roughly half the total aggregate annual value added in the economy.

   b. Using these rough estimates, US productivity growth could reach a level closer to 2.5% annually. Productivity might even be higher if the benefits of the New IP and Internet of Things are adopted in a large number of industries.

   c. Firms that adopt the technologies studied here are likely to be more competitive than their rivals that fail to do so. This will change the nature of competitiveness nationally and globally.

4. Enhancing the skills of the workforce.

   a. The New IP and the Internet of Things are likely to simplify many positions in firms that are quite complex today. We have already seen firms combine data analytics with machine learning to simplify complex analysis, such as coordinating a complex supply chain (at Ford) or developing more time-efficient and fuel-efficient delivery routes (at UPS).

   b. This will make it easier to recruit workers with modest levels of skills or to train workers to use the tools that complement the New IP and the Internet of Things. It will change employment by making it possible for those with associate or high school degrees to perform work that only PhDs could do when the processes were first developed. This will also create job ladders that do not exist today outside of a few very innovative firms.