**Sun-setting the PSTN**

Critical Legacy Transition Working Group

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Background

For decades, the PSTN has had such dominant penetration (>90%) in U.S. households and businesses that, it is de facto, one of our national “systems of record” for achieving social and economic goals related to communication. The assumption that such goals can be achieved via the PSTN was based on its high level of penetration and some of those goals, such as universal service, created a positive feedback loop that further reinforced the central position of the PSTN.

Problem Statement:

•Our population is quickly migrating to voice services that are not part of the traditional PSTN, thus negating the assumption, that the current system of PSTN regulation and subsidy can continue to support our social and economic needs as a nation. Examples include: 3G and 4G cellular; VoIP; over the top services such as Skype; and many others.

•PSTN services may continue to be made available to subscribers at some price, but the cost per user may increase dramatically as the number of users decreases. Thus, the cost of subsidizing access to the system will rise dramatically – even though the PSTN will no longer achieve a number of the goals it has supported in the past.

•Thus, when we talk about sun-setting the PSTN we are talking about: (a) the orderly transition from the PSTN’s role as a “ system of record” for achieving key national goals; and (b) the identification of and migration to alternative mechanisms of achieving the subset of those goals that remain important to our society and economy. This may or may not lead to the withdrawal of specific PSTN technologies and/or services.

Opportunity Statement

In addition to the availability of alternative mechanisms for voice communication there are now new services, a number of which have high levels acceptance and use within U.S. households and businesses, that could provide equivalent or even vastly superior means of achieving some of the social and economic goals previously attained via the PSTN. Among others, these new services include: messaging services such as IM/SMS; mature applications like email; social networking services such as Facebook, Twitter, and many others; web and cellular based Geographical Information Systems such as Google Maps, Mapquest, TomTom, Garmin, and Navteq; and many widely accepted applications on smart phones. Furthermore, since the PSTN does not provide anything close to the services and capabilities of many of the replacement technologies, new national-scale social and economic opportunities may be enabled through near universal adoption of some of these technologies. For example, in the past it has been argued that universal access to voice telephony was essential to helping unemployed individuals gain access to job opportunities. Today, it is hard to imagine, how a job seeker could be effective without access to Internet-based job postings and social networking. Similarly, social networks, GIS applications, and similar software services have proven themselves to be effective tools in providing critical national capabilities in dealing with problems such as large-scale disasters.

Facilitating the new Sunrise: What are we transitioning to?

With the advent of digital communications technologies (especially those that are packet-based, such as the Internet) we have the opportunity to think differently about “systems of record”, separating the underlying packet transfer mechanisms from the services provided over them. Thus we can replace the prior approach to vertically integrated “systems of record” (such as telephony, radio, television) with a multi-level approach consisting of:

•Broadband digital services, attained through a multiplicity of systems that transfer digital information (cellular, WiFi, other RF, xDSL, cable, fiber, etc.). To meet our national goals these may collectively have to achieve certain targets with respect to universal penetration, reliability, emergency pre-empt, etc. This includes the supporting infrastructure (power, OAM, DNS, management processes, etc) required to keep these systems functioning.

•Collections of application services (voice, video, text, social networks, information services. etc.) which, when combined with the broadband services (and each other), can attain national goals, such as emergency notification, E-911, accessibility, etc. It may be important for some services to meet goals with respect to characteristics, such as reliability, predictable operation during periods of overload, etc. in order to function as adequate alternatives to the traditional system(s) of record.

There will also be a need for coordination mechanisms (e.g. market mechanisms, standardization, self-regulation, testing, simulation, emergency preparedness drills, government oversight, etc.) to ensure that selected combinations of the above operate sufficiently well to meet specific national needs. This does not mean they have to be perfect or absolutely universal, just as the existing systems of record have never achieved 100% universality or reliability. Furthermore, it is important to realize that the specific combinations will evolve over time as new broadband and application services become available and achieve relevant degrees of penetration.

History

•The United States has been a prime driver in creating new technology, business models, and regulatory frameworks for modern information and communications infrastructure. For the Nation to fully realize the benefits of current and future innovations and to improve its competitive posture there is considerable benefit in accelerating the transition to a set of interoperable, more scalable and capable services. The result of doing so has benefits for our citizens, the competitiveness of our commercial sector, and for our public and government institutions.

•One of the existing “systems of record” for our national communications is the PSTN – *the Public Switched Telephone Network.* It has been extremely successful and in its heyday the envy of much of the world. This system consists of a core technology that has evolved over a considerable period of time and has been adopted to serve all of our citizens in their every day lives, and our business and public institutions in almost all sectors. The PSTN was based on a point-to-point infrastructure that provided service to a ‘fixed’ location, with 2-way interactive voice as its primary service. The PSTN has been used as a common mechanism to attain a number of national social and economic goals related to communication.

Attaining national goals

•Examples of such goals include universal service & accessibility, emergency services and reliability at the individual incident level, emergency services, robustness and priority access at larger scales, to deal with crisis and disasters. Uses of the PSTN have also expanded beyond telephony to include critical services, Facsimile transmission, payment systems, and alarms, among others.

•For many of these cases, both policy & otherwise, the PSTN is the “system of record” whose use is mandated by standards, regulations, building codes, business practices, etc.

•With the availability of new and more capable modes of communication and information services (e.g., VoIP, text messaging, IPTV, social networks, and wireless) there are now alternative ways to achieve many of these national goals and/or non-voice services, and to go beyond the current benefits provided by the PSTN.

Beyond Vertical Integration

•The PSTN consists of four components: the physical infrastructure, the underlying technology; economic and business models; and the regulatory regimes that govern service requirements, investment incentives, and government oversight. In the past, these components were considered in the context of a vertically integrated environment in which voice telephony was the primary service offering.

•The PSTN is rapidly being displaced by a less integrated environment, in which the transfer of information, through broadband packet services, is decoupled from the application services operating over them. This diverse and rapidly evolving collection of services offers richer functionality, a lower cost structure, capabilities beyond geographically fixed services and have been widely adopted on a competitive market basis.

•The loose coupling creates opportunities to provide exploit redundancy and provide superior services but also makes it difficult to reason about the properties of the overall system, e.g., with respect to robustness, prioritization, etc.

Orderly and Timely Transition

•The PSTN no longer functions as a universal communication infrastructure and thus it may no longer meet a number of the goals our society has previously relied on it for.

•As the number of users of core PSTN services decreases, the corresponding cost per user may increase until maintaining the PSTN becomes prohibitive.

•The distinguished position of the PSTN as “a system of record” and all that entails may be a barrier to the rapid penetration of advanced technologies and new business models.

•It makes sense to create an orderly process for sun-setting the role of the PSTN as a system of record. This will require the identification of, and orderly transition to, alternative approaches to meeting those national goals previously attained through the PSTN that remain valid. It may also involve ending certain regulations and subsidies that would otherwise artificially prolong the existence and usage of the PSTN beyond its economic viability. Where appropriate, it may involve the redirection of subsidies and incentives to replacement solutions and/or the creation of new industry governance mechanisms.

•A timely and orderly transition process may also create new economic opportunities by stimulating growth and experimentation within the communications sector and improve our national competitiveness by accelerating the (near) universal adoption of new and more efficient technologies throughout the public and private sectors or our economy.

•To ensure a timely and orderly process, a data certain should be established by which the above transition, especially with respect to regulation and subsidies, will be completed.

Summary

•When we talk about Sun-Setting the PSTN we are talking about:

(a) The orderly transition from the PSTN’s role as a “ system of record” for achieving key national goals;

(b) The identification of and migration to alternative mechanisms of achieving the subset of those goals, which remain important to our society and economy.

(c) This will leave specific PSTN technologies and/or services to compete with other technologies and may or may not result in the withdrawal of some PSTN services in the future.