Appendix G: Sweden

Overview

ITIF Rank: 6

Subscribers per Household[1]	0.54	**Incumbent Government Owned**	45.3%
Internet Users in Millions[2]	6.98	**Local Loop Unbundling:[3]**	
Internet Users per 100 Inhabitants[4]	76.97	**Full Copper Loop**	Yes
Average Speed in Megabits per Second (Mbps)[5]	16.8	**Shared Copper Loop**	Yes
Price Per Month of 1 Mbps USD PPP[6]	.63	**Bitstream**	Yes
Percent of Urban Population[7]	83	**Cable**	No
Population Density per sq. km[8]	20	**Fiber**	No

Geography and Demography

Sweden is a large country (slightly larger than California) with a relatively small population (9 million compared to California's 35 million). It has one of the lowest population densities in Europe (only 20 people per square kilometer)[9] and the majority of its population is clustered in the south of the country and in coastal areas (in the cities of Stockholm, Göteborg, and Malmö). About half of Sweden's 4 million households are located in apartment buildings. Its percentage of urban population (83 percent) is comparable to the United States and even to South Korea.[10]

Policy

Sweden was the first country in Europe to develop a broadband policy. As early as 1999 the government recommended that the state should take action in rural and remote areas with no market deployment.[11] While the government generally allows the market to determine how to deliver broadband service, it believes that it is the government's responsibility to ensure access in rural areas where government support may be necessary.[12] So, it is perhaps not surprising that a 2007 government survey found that Sweden is coming close to delivering 100 percent broadband access. When considering subscribers who have access to broadband services either through wireline or wireless service (mobile CDMA2000) just 2,300 households lack access to broadband.[13] This success is largely due to the fact that the Swedish government has been actively involved in promoting broadband access from the beginning. Despite this success, in April 2008 a government-appointed Committee of Inquiry determined that because 145,000 people and 39,000 businesses still lack access to wireline broadband (i.e., fiber, digital subscriber line (DSL), or cable) between 2009 and 2013 the government should provide $500 million in grants to encourage the development of broadband infrastructure (particularly fiber) in areas where none exists.[14] The government subsidized broadband infrastructure development through a variety of programs, including tax reductions for broadband access installations in high cost areas, funding to local authorities that establish operator neutral networks in rural and remote areas, and requiring state-owned companies to build a high-speed backbone infrastructure for emergency services.[15] The government allocated a total of $820 million to stimulate the infrastructure roll out.

Policy (*continued***)**

There are also some 200 metropolitan networks in more than 100 towns owned and run by the local authorities. In addition, the government assigned Svenska Kraftnät, a national electricity utility company, to build a backbone network to link all of Sweden's 290 municipalities on commercial grounds.[16]

Despite its already high level of broadband penetration, in February 2007, the Swedish regulator – Post & Telestyrelsen (PTS) – announced a "Proposal for Swedish Broadband Strategy," for all Swedish customers to have broadband access (at least 2 Mbps) by 2010 and for most if not all to have a choice of several operators.[17] To achieve this, the PTS proposes government support of $180 million to rollout broadband infrastructure (with EU structural funds of roughly $90 million); minimum broadband requirements for infrastructure supported by government funds, regulations to ensure networks are open to competition, encouraging municipalities to work together to roll out broadband networks, treating broadband as a universal service, and investigating the use of power lines for broadband.[18]

Sweden's broadband regulatory policy is influenced by the fact that it had a government monopoly – Telia (now TeliaSonera) – for fixed telephony. In addition, because Telia was state-owned and the Swedish state also controlled several other communications infrastructures (power, railroads, and broadcasting) the government has long had a strong reason to involve itself in the administration of these networks. However, Sweden has since deregulated these markets but still keeps an ownership of some infrastructure, subject to competition through access regulation or parallel privately owned infrastructures. Even as recently as 2003 the government owned 78 percent of the high-speed network infrastructure.[19] Although Telia merged with the Finnish incumbent operator, Sonera Oyi, in 2002 to create TeliaSonera, the Swedish government still owns 45.3 percent of the company (and Finland owns 13.7 percent).[20]

Rural Access

To spur broadband deployment in rural areas, the Swedish government allocated $820 million to stimulate the infrastructure roll out, including $250 million in grants to communities to build local broadband networks, both in the towns and in the surrounding countryside, and another $250 million in tax relief amounting to 50 percent of the cost to build the network to homeowners and businesses to spur development of network infrastructure in homes and buildings. The grants were limited to those communities with no existing broadband providers and the procurement process had to be open and operator-neutral. Moreover, municipalities had to provide at least 10 percent of the cost of building the network with government support limited to a one-time subsidy for 5-year contracts.[21] In addition to government grants, operators themselves estimate that they invested more than $1 billion in these government-supported projects from 2001 to 2007.[22]

Given that TeliaSonera, the incumbent telecommunications operator, owns the majority of Sweden's telecommunications infrastructure, the company had the advantage of being able to bid low for these projects since it could simply upgrade its existing network. Not surprisingly, it won 65 percent of the projects. Other providers were government-owned energy and broadcasting companies, allowing them to offer lower prices for their services since they did not have to meet the revenue expectations of TeliaSonera, a publicly traded company.

A government-appointed Committee of Inquiry recommended in April 2008 that the government should spend an additional $500 million on grants to municipalities and operators to deploy mainly fiber networks in those rural areas that have no access to broadband services. However, as with previous funding for rural broadband infrastructure, government funding would be limited to 50 percent of the costs, with operators and municipalities providing the balance.[23]

Competition

Government ownership of TeliaSonera is a key consideration in Sweden's broadband strategy.[24] This is because broadband competition requires competing DSL providers to be able to access TeliaSonera's network at the local loop. Thus, the Swedish government's strategy includes policies to ensure that TeliaSonera's broadband competitors can get access to the company's network on terms that don't favor TeliaSonera's retail organizations and at reasonable interconnection rates.[25] So, PTS requires it to unbundle its local loop to allow non-discriminatory access to competing broadband service providers. In 2003, PTS required TeliaSonera to lower its prices for competitors to access its local loops because it argued that the company had been using discriminatory pricing practices – favoring some operators over others.[26] The next year, the PTS determined that TeliaSonera had significant market power and required it to meet all reasonable requests from competing operators for bitstream access. TeliaSonera, however, appealed this decision in court, which suspended the obligation while it considered the appeal.[27] In February 2007 the matter was settled by the Supreme Administrative Court and the decision has been in force ever since. In 2005, PTS determined that TeliaSonera must offer naked DSL, allowing customers to take fixed telephony and broadband services from different providers.

As a result of the Swedish government's strong regulatory stance, the country has one of the most active markets in unbundled local loops.[28] The first major broadband competitor to TeliaSonera was Bredbandsbolaget – called B2 – which began providing services in 1999. It had the advantage of a strategic partnership with the National Swedish Rail Administration because it could use the railway communications infrastructure.[29] B2 has concentrated mainly on providing high-speed Ethernet and very high speed DSL (VDSL) broadband services, beginning with speeds of 10 Mbps and later upgraded to 100 Mbps.[30]

The other major competitor was Bostream, which established its service in 1999 by leasing TeliaSonera's network.[31] It launched asymmetric DSL (ADSL) and VDSL services in 2003, but B2 acquired the company in 2004, which gave it a 23 percent of the market.[32] By 2007, TeliaSonera's private broadband market share in the private broadband market shrank to 38 percent, B2 had 18 percent, Com Hem followed with 17 percent, and Glocalnet had 7 percent.[33] Asymmetric DSL (ADSL) still is the technology of choice for broadband providers with 45 percent of the market (up from 39 percent in 2006).[34] Traditional dial up access came at 26 percent, followed by cable at 16 percent, and fiber LANs at 13 percent. While the numbers of dial up connections are still high, this may be because many Swedish residents keep their dial up account – which often is very cheap if not free – even when they also are subscribing to higher speed access.

There is less competition from cable, which comprises only 16 percent of the market, but ahead of fiber at 13 percent, perhaps because TeliaSonera owned the cable infrastructure until 2003, when it divested its cable subsidiary, Com Hem, which has not modified the majority of its cable lines for broadband access.[35]

Fiber

As noted in the policy section above, the Swedish government provides support to municipalities to procure networks to rollout fiber broadband services, which may be operated by private companies.[36] In fact, municipalities, housing associations, and local utility providers have built many of Sweden's fiber networks and then opened these up to service suppliers such as Internet service providers (ISPs), TV and telephone companies.[37] For example, in Stockholm, the Stokab project consists of a fiber-optic (dark fiber) network developed in 1999 in the commercial districts and large industrial areas. The City of Stockholm and the Stockholm County Council own the network

Fiber (*continued***)**

and lease capacity to ISP's. They offer the fiber-optic infrastructure and leave the services and new service development to telecommunications companies leasing their capacity.[38] Stockholm's local governments invested $100 million in the project and are generating a small profit. These fiber networks may contribute to the fact that Sweden has a higher percentage than the other Nordic countries of broadband subscribers with rapid connections, of which more than half deliver speeds of at least 2 Mbps, yet prices per megabit are lower in Sweden than in the other Nordic countries.[39]

Demand

The Swedish government, in addition to supporting broadband infrastructure development, also created programs to encourage broadband demand. The primary focus of these programs has been increasing digital literacy, access to personal computers, and use of broadband for education. Accordingly, the government subsidized personal computer purchases via tax deductions for companies that bought computers for their employees' personal use.[40] In addition, to increase demand the government introduced a $25 million project to raise IT literacy among schoolteachers.[41] In the private sector, service providers are increasingly recognizing that broadband content will help drive demand when high-speed networks also are in place. Consequently, all four Swedish broadband operators offer combined broadband and fixed telephony, while Com Hem (the broadband cable provider) also offers a "triple play" package.[42] In addition, B2 launched an IPTV service for its FTTH subscribers in 2005 and for its DSL subscribers is 2005, along with a video-on-demand (VoD) service.

ENDNOTES

1. OECD measures penetration on a per capita basis because comprehensive data on household penetration is generally unavailable. ITIF has used average household size as a multiplier to convert June 2007 OECD per capita penetration data to household penetration data. It should be noted that one problem with this method is that the OECD data likely also includes some DSL business subscribers.

2. International Telecommunications Union, "Internet Indicators: Subscribers, Users, and Broadband Subscribers," International Telecommunications Union ICT Statistics Database (ITU, 2006) <www.itu.int/ITU-D/icteye/Indicators/Indicators.aspx#>.

3. Unbundling is a policy by which regulators require incumbent telecommunications operators (those with dominant market status who control access to the telecommunications infrastructure) or cable companies to give their competitors access to raw copper pairs, fiber, or coaxial cable networks so that they can install their own transmission equipment at the incumbent's central office (local exchange). *Full unbundling* requires the incumbent to make all copper pair frequencies or fiber networks available to competitors. *Shared access* to the local loop requires the incumbent to make the "high" frequency bands (those that carry data, but not voice) of the copper pair available to its competitors, allowing them to offer xDSL broadband services. *Bitstream access* requires incumbent operators to allow competitors access to the incumbents' equipment at their central office. *Cable access* enables competitors to use cable companies' coaxial cable local loops and fiber access requires telecommunications operators to give competitors access to their fiber local loops.

4. International Telecommunications Union, "Internet Indicators: Subscribers, Users, and Broadband Subscribers," International Telecommunications Union ICT Statistics Database (ITU, 2006) <www.itu.int/ITU-D/icteye/Indicators/Indicators.aspx#>.

5. Our methodology for calculating broadband speed in the ITIF Broadband Rankings involves averaging the speeds of the incumbent DSL, cable and fiber offerings provided in the OECD's April 2006 "Multiple Play," report, with each assigned a weight according to that technology's respective percentage of the nations overall broadband subscribership, as reported in the OECD's "Broadband Statistics to December 2006."

6. USD price per bit (PPP) of the fastest available technology is calculated from the broadband offerings examined in the OECD's "Multiple Play: Pricing and Policy Trends" report.

7. The World Bank, "Information and Communications for Development 2006," (2006): 172.

8. The United Nations, "World Population Prospects: The 2006 Revision Population Database," 2007 <esa.un.org/unpp/>.

9. Ibid.

10. The World Bank, "Information and Communications for Development 2006," (2006): 271.

11. Arsyllfa Band Eang Cymru-Broadband Wales Observatory, "Sweden Broadband Market Report 2005"<www. broadbandwalesobservatory.org.uk/broadband-3045>.

12. Post & Telestyrelsen, "Broadband Survey 2007," January 2008 <www.pts.se/Dokument/dokument.asp?Sectionid=&Ite mid=7679&Languageid=EN>.

13. Ibid.

14. Swedish Government Committee of Inquiry, "Bredband till hela landet," SOU 2008:40, April 18, 2008 <www. regeringen.se/content/1/c6/10/33/76/d6a4d016.pdf>.

15. Martin Fransman (ed.), *Global Broadband Battles: Why the U.S. and Europe Lag While Asia Leads* (Stanford, California: Stanford Business Books, 2006): 248.

16. Arsyllfa Band Eang Cymru-Broadband Wales Observatory, "Sweden Broadband Market Report 2005"<www. broadbandwalesobservatory.org.uk/broadband-3045>.

17. Post & Telestyrelsen "Broadband Prices in the Nordic Countries in 2006," (January 2007): 16.

18. Ibid: 10.

19. Martin Fransman (ed.), *Global Broadband Battles: Why the U.S. and Europe Lag While Asia Leads* (Stanford, California: Stanford Business Books, 2006): 247.

20. Arsyllfa Band Eang Cymru-Broadband Wales Observatory, "Sweden Broadband Market Report 2005"<www. broadbandwalesobservatory.org.uk/broadband-3045>.

21. Sweden's Post and Telecom Agency (PTS), "Broadband in Sweden," presentation to the Information Technology and Innovation Foundation (ITIF) on December 7, 2007.

22. Swedish Government Committee of Inquiry, "Bredband till hela landet," SOU 2008:40, April 18, 2008 <www. regeringen.se/content/1/c6/10/33/76/d6a4d016.pdf>.

23. Ibid.

24. Post & Telestyrelsen "Proposal for Swedish Broadband Strategy," (February 15, 2007): 19.

25. Ibid.

26. Arsyllfa Band Eang Cymru-Broadband Wales Observatory, "Sweden Broadband Market Report 2005"<www. broadbandwalesobservatory.org.uk/broadband-3045>.

27. Post & Telestyrelsen, "Broadband Prices in the Nordic Countries in 2006," (January 2007): 58.

28. Arsyllfa Band Eang Cymru-Broadband Wales Observatory, "Sweden Broadband Market Report 2005"<www.broadbandwalesobservatory.org.uk/broadband-3045>.

29. Martin Fransman (ed.), *Global Broadband Battles: Why the U.S. and Europe Lag While Asia Leads* (Stanford, California: Stanford Business Books, 2006): 47.

30. Arsyllfa Band Eang Cymru-Broadband Wales Observatory, "Sweden Broadband Market Report 2005"<www.broadbandwalesobservatory.org.uk/broadband-3045>.

31. Martin Fransman (ed.), *Global Broadband Battles: Why the U.S. and Europe Lag While Asia Leads* (Stanford, California: Stanford Business Books, 2006): 48.

32. Post & Telestyrelsen, "The Swedish Telecommunications Market First Half Year 2007" (2007).

33. Ibid.

34. Ibid: 33.

35. Ibid: 39-40.

36. Ibid: 39.

37. Arsyllfa Band Eang Cymru-Broadband Wales Observatory, "Sweden Broadband Market Report 2005"<www.broadbandwalesobservatory.org.uk/broadband-3045>.

38. "Stockholm's Municipal Fiber Network Stimulates New Business," CAnet-3-NEWS, April 17, 2000 <mail.canarie.ca/MLISTS/news2000/0079.html>.

39. Post & Telestyrelsen, "Broadband Prices in the Nordic Countries in 2006" (January 2007): 39-40.

40. Martin Fransman (ed.), *Global Broadband Battles: Why the U.S. and Europe Lag While Asia Leads* (Stanford, California: Stanford Business Books, 2006): 243.

41. Ibid: 248.

42. Post & Telestyrelsen, "Broadband Prices in the Nordic Countries in 2006" (January 2007): 54-55.