



# 1800 MHz band refarming case study

## Sweden

*29 November 2011*

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## 1. Introduction

The purpose of this paper is to present a case study on the Swedish process of refarming the 1800 MHz mobile band for documenting and sharing experience on what has happened in an actual refarming case.

This paper will not contain any assessments on whether the process carried out or the outcome of it is optimal or whether improvement potential can be identified. Furthermore, this paper does not intend to and it does not express any views or positions of the GSMA and/or the mobile industry.

It seems like the information on and documentation of the different stages of the process taking place between 2009 and 2011 is published by the regulator PTS. PTS have also published consultation documents and consultation responses. PTS published its final decisions. PTS have consulted publicly and published the responses received in the 1800 MHz band auction preparation process. PTS informed the public about the complaint filed and causing the auction being postponed and PTS did inform the public about the complaint being rejected. The sources and the information are available in a mix of Swedish and English. The references included in footnotes of this case study provide links to the English versions where available and reverts to the sources in Swedish when English versions are not available. Using the case study to understand the Swedish 1800 MHz band restructuring process does not depend upon the reader understanding Swedish.

The case study has been developed by Kristin Due Hauge and Swedish operators have been involved in reading and commenting on the draft. GSMA would like to thank HI3G/Hutchinson, Tele2, Telenor and TeliaSonera for their cooperation, for being very positive and supportive throughout the process and for their approval of the case study prior to GSMA releasing it.

## 2. Executive summary

The Swedish 1800 MHz band restructuring process comprises prolonging the existing 1800 MHz band licenses for a couple of years allowing the incumbents to adjust to changes, renewal of incumbents licenses but with reduced bandwidth per licensee and an auction of 2X35 MHz bandwidth that would be vacant after the renewal of incumbents licenses would come into force by 1 January 2013. The renewed licenses and the licenses sold in the 2011 auction will entry into force by 1 January 2013 and at the same day the usage rights will become more technology neutral so 1800 MHz band licensees can deploy mobile technologies that can technically co-exist (with the existing GSM deployments).

The process was initiated by the 2009 license renewal applications from the three 1800 MHz band incumbents with usage rights expiring by 31 December 2010 and the 2009 license renewal application from the 1800 MHz band incumbent with a usage right expiring by 31 May 2017. In December 2009 the Swedish regulator PTS published its draft decisions on 1800 MHz band license renewal for the incumbents and consulted on those.

In 2010 PTS decided to prolong the existing licenses of the three incumbents which had usage rights expiring 31 December 2010 so that new expiry date was 31 December 2012. At the same time PTS decided to renew the licenses of the three incumbents but with approximately half of the bandwidth per licensee so the renewed licenses would comprise 2X10 MHz per license. PTS prolonging the incumbents licenses until 31 December 2012 was done to give them about two years to adjust their existing GSM networks to the new configuration of the 1800 MHz band and their renewed licenses. PTS renewing the incumbent's licenses assigning each licensee 2X10 MHz for the term 1 January 2013 to 31 December 2027 was done to ensure GSM operations could continue to the benefit of the Swedish society and its consumers and because PTS concluded renewing those licenses did meet the criteria of (economic) efficient use of the 1800 MHz band resource.

The application for renewal of the license with expiry by 31 May 2017 was rejected. The reasoning for the rejection was that assessing a renewal almost eight years prior to expiry was too early in terms of being able to assess whether a renewal would meet the criteria laid out in the legal framework.

The renewal of the incumbents 1800 MHz band licenses did mean 2X40 MHz of 1800 MHz spectrum would be vacant by 1 January 2013. Since publishing its consultation on renewing the incumbents licenses in December 2009 PTS had made their intention to auction off the vacant spectrum known to the public. In parallel with the renewal of licenses process PTS prepared and consulted all interested parties on the upcoming 1800 MHz band auction.

In August 2011 PTS approved a secondary market transaction of two of the three incumbent licensees who had received a renewed license transferring their licenses that would apply from 1 January 2013 to a commonly owned network company they had established. This transaction paved the way for this commonly owned company also being the registered bidder in the 1800 MHz band auction a couple of months later.

In October 2011 PTS used a clock format auction to allocate 2X35 MHz of 1800 MHz band spectrum to become vacant by 1 January 2013. The first stage of the auction was about bidding for amounts of generic bandwidth. The second stage of the auction was designed to determine the spectral placing of the winners of the first stage of the auction *and* of the incumbents that had their licenses renewed for the term 1 January 2013 to 31 December 2027 prior to the auction. In other words, the second stage of the auction was used for determining the reconfiguration of the 1800 MHz band that would apply from 1 January 2013.

Following the process of renewing incumbents licenses and assigning three licensees 2X10 MHz of bandwidth each, assigning the fourth incumbent licensee additional bandwidth so this licensee control 2X5 MHz, approving the secondary market transactions so that there were two licensees with renewed spectrum by August 2011 and the outcome of the October 2011 auction Sweden will end up with two 1800 MHz band licensees by 1 January 2013: Net4Mobility holds the usage right for the bands 1745-1780 / 1840-1875 MHz (2X35 MHz of bandwidth) and TeliaSonera holds the usage right for the bands 1710-1745 / 1805-1840 MHz (2X35 MHz of bandwidth).

The terms and conditions of the renewed licenses and of the terms and conditions attached to the licenses sold in the auction were based on a more technology neutral approach and a service neutral approach. The licenses entering into force 1 January 2013 will allow for deployment of mobile technologies that can co-exist with the existing GSM deployments. Consequently, the Swedish 1800 MHz band licensees may use their usage rights for deploying e.g. GSM/EDGE/GPRS, UMTS/HSPA and LTE from 1 January 2013.

### 3. 2009-2010: public consultation

On 8 December 2009 PTS published information about having received applications on renewal of 1800 MHz band licenses from the four incumbents:

- Tele2, Telenor and TeliaSonera; incumbents with licenses expiring 31 December 2010.
- Spring Mobil GSM; incumbent with a license expiring 31 May 2017.

PTS' announcement of the received applications was accompanied by the PTS proposals on partly renewing the 1800 MHz band licenses of Tele2, Telenor and TeliaSonera.<sup>1</sup> Deadline for responding to the public consultation released on 8 December 2009 was set to 19 January 2010.

PTS' proposal in short:

- Approve renewal of Tele2, Telenor and TeliaSonera' s licenses but reduce bandwidth per licensee so that their renewed licenses would be 2X10 MHz bandwidth per operator expiring 31 December 2027.
- Additional assignment of bandwidth to Spring Mobil so their bandwidth increases from 2X3 MHz to 2X5 MHz but license not to be renewed so that expiry would remain at 31 May 2017.
- Arrangement of incumbents all being granted prolonged licenses until 31 December 2012 for them to be able to adjust current network operations to new configuration.
- The 2X40 MHz of bandwidth that would become vacant from 1 January 2013 to be auctioned, by Q3/Q4 2010 PTS indicated.

PTS explained that the purpose was to make it possible for the incumbent 1800 MHz band operators to continue offering GSM services. PTS stated this were important to the Swedish society because of the number of citizens continuing to rely upon GSM services.

PTS claimed restructuring the band into 2X5 MHz blocks was about adjusting for future technologies utilizing the 1800 MHz band. In this context PTS referred to the European Union Commission that had decided that the 1800 MHz band should be opened up for UMTS and other technologies that could technically co-exist with GSM and UMTS.

At the same time PTS indicated that they intended to prolong the existing licenses with same bandwidth and spectral placing of licensees until 31 December 2012 giving incumbents time to adjust their on-going operations according to the new assignments under the renewed licenses coming into force 1 January 2013. The renewed licenses would mean reduced bandwidth for the three operators Tele2, Telenor and TeliaSonera from 1 January 2013.

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<sup>1</sup> In Swedish: <http://www.pts.se/sv/Nyheter/Radio/2009/PTS-samrader-beslut-om-frekvenstilldelning-i-1800-MHz-bandet/>

When the reconfiguration process of the 1800 MHz band will be completed by 31 December 2012 an aggregated bandwidth of 2X35 MHz will constitute the renewed licenses of the incumbents. The full bandwidth of the internationally harmonised 1800 MHz mobile band is 2X75 MHz. This means 2X40 MHz will be vacant by 1 January 2013 provided the renewal arrangement proposed by PTS was adopted.

PTS informed the public about having received applications from third parties demanding 1800 MHz band spectrum. Furthermore, PTS stated that demand for 1800 MHz spectrum did exceed supply and that their intention was to make the 2X40 MHz spectrum that would be vacant from 1 January 2013 available through an auction. PTS indicated that the auction might happen by Q3/Q4 2010.

PTS indicated their intension was to allow all interested parties, including the incumbents in the 1800 MHz band, to register for participation in the auction for the 2X40 MHz of 1800 MHz spectrum and they would design the auction so that securing contiguous bandwidth would be possible.

The 8 December 2009 announcement from PTS also contained an invitation to the 18 December 2009 public consultation meeting on the preparations for the 1800 MHz auction where PTS would present their proposals and open up for public debate. The invitation made it clear that participants would be able to put forward their views on timing of the proposed auction, spectrum cap rules and expiry of licenses to be auctioned and auction design. PTS also informed about their intention to use the public consultation meeting to share information on the status on the work on international technical harmonisation.<sup>2</sup>

### **a. The public consultation documents**

For the public consultation<sup>3</sup> on renewing the incumbents licenses PTS published the following documents:

- Consultation letter (missiv)<sup>4</sup>
- Draft decision Spring Mobil<sup>5</sup>
- Draft decision Tele2<sup>6</sup> and draft annex Tele2<sup>7</sup>
- Draft decision Telenor<sup>8</sup> and draft annex Telenor<sup>9</sup>
- Draft decision TeliaSonera<sup>10</sup> and draft annex TeliaSonera<sup>11</sup>

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<sup>2</sup> In Swedish: <http://www.pts.se/sv/Nyheter/Radio/2009/PTS-bjuder-in-till-hearing-om-framtida-tilldelning-i-1800-MHz-bandet/>

<sup>3</sup> The consultation website, in Swedish: <http://www.pts.se/sv/Dokument/Remisser/2009/Remiss-ang-beslutsforslag-om-tillstand-och-villkor-i-1800-MHz-bandet/>

<sup>4</sup> In Swedish: <http://www.pts.se/upload/Remisser/2009/1800-remiss-missiv-091208.pdf>

<sup>5</sup> In Swedish: <http://www.pts.se/upload/Remisser/2009/1800-springmobile-remiss-09-10246-091208.pdf>

<sup>6</sup> In Swedish: <http://www.pts.se/upload/Remisser/2009/1800-tele2-remiss-09-6991-091208.pdf>

<sup>7</sup> In Swedish: <http://www.pts.se/upload/Remisser/2009/1800-tillstand-tele2-bilaga-091208.pdf>

<sup>8</sup> In Swedish: <http://www.pts.se/upload/Remisser/2009/1800-telenor-remiss-09-7795-091208.pdf>

<sup>9</sup> In Swedish: <http://www.pts.se/upload/Remisser/2009/1800-remiss-tillstand-telenor-bilaga-091208.pdf>

The 1800 MHz band consists of 2X75 MHz of internationally harmonised mobile band spectrally placed in the 1710-1785 MHz band (uplink) and the 1805-1880 MHz band (downlink). The full 1800 MHz band is available for mobile in Sweden.

### **i. Spring Mobil**

This license was awarded by PTS on 29 May 2002 to Swefour AB but via a number of secondary market transfers of the license it ended up with Spring Mobil GSM AB which had been the licensee since 27 August 2009.

Spring applied for:

- Contiguous bandwidth of 2X5 MHz exclusive of guardbands, preferably with spectral placing at lower parts of the 1800 MHz band (as their current spectral placing)
- Lifting the GSM-only restrictions and imposing technology neutral conditions
- Abolishing the indoor-only restrictions of current license
- Expiry date of 31 December 2025 for the extended bandwidth and revised terms and conditions (license prolonged, from expiry date 31 May 2017 to new expiry date 31 December 2025).

PTS proposal, draft license published:

- License not to be prolonged. Deciding upon renewal of a license about eight years prior to its expiry is too early for assessing the application according to the criteria in the relevant legal basis for license renewal. Consequently expiry date to remain 31 May 2017.
- Existing Spring Mobil assignment of 1800 MHz band frequencies were the 1806.9-1809.9/1711.9-1714.9 MHz bands (2x3 MHz bandwidth). PTS proposed to award Spring Mobil additional 2X2 MHz of bandwidth so that their total bandwidth in the 1800 MHz band would be 2X5 MHz.
- Existing terms and conditions and the 2X3 MHz bandwidth usage right to be prolonged until 31 December 2012. Except from the coverage and roll-out requirements which were abolished by the PTS decision of 13 March 2009 and the indoor-only conditions for the 1813.3-1816.3/1718.3-1721.3 MHz bands that PTS intended to lift when finalising the decision put out on this consultation.

Spring would end up with:

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<sup>10</sup> In Swedish: <http://www.pts.se/upload/Remisser/2009/1800-teliasonera-remiss-09-6596-091208.pdf>

<sup>11</sup> In Swedish: <http://www.pts.se/upload/Remisser/2009/1800-tillstand-teliasonera-bilaga-091208.pdf>



- Until 31 December 2012; Spring Mobil to keep their 2x3 MHz bandwidth. The indoor-only restriction lifted.
- From 1 January 2013; Spring Mobil to be assigned 2X5 MHz bandwidth. Expiry by 31 May 2017. The GSM-only restriction to be lifted so that Spring Mobil may deploy UMTS and other mobile technologies that can co-exist with GSM and UMTS within the boundary of the legally binding EU technical harmonisation instruments.

## ii. Tele2, Telenor, Telia

Tele2's assignment in the 1800 MHz band was 2X21 MHz but non-contiguous:

- The 1835.1-1853.1/1740.1-1758.1 MHz bands (2X18 MHz) for outdoor use
- The 1810.1-1813.1/1715.1-1718.1 MHz bands (2X3 MHz) for indoor use.

Telenor's assignment in the 1800 MHz band was 2x18.4 MHz but non-contiguous:

- The 1862.5-1877.9/1767.5-1782.9 MHz bands (2X15.4 MHz) for outdoor use
- The 1813.3- 1816.3/1718.3-1721.3 MHz bands (2X3 MHz) for indoor use.

TeliaSonera's assignment in the 1800 MHz band was 2x23 MHz but non-contiguous:

- The 1819.5-1834.9/1724.5-1739.9 MHz bands (2X15.4 MHz) for outdoor use
- The 1853.3-1857.9/1758.3-1762.9 MHz bands (2X4.6 MHz) for outdoor use
- The 1816.5-1819.5/1721.5-1724.5 MHz bands (2X3 MHz) for indoor use.

Tele2, Telenor and TeliaSonera applied for:

- Renewal of license, new expiry date by 31 December 2025.
- Tele2: a usage right of 2X20 MHz contiguous bandwidth.
- Telenor: a usage right of 2x 25 MHz contiguous bandwidth.
- TeliaSonera: a usage right of 2X25 MHz contiguous bandwidth.
- Current conditions on coverage means Tele2/Telenor/TeliaSonera must use its 900 MHz and 1800 MHz licenses to provide GSM coverage in areas with more than 50 000 citizens plus areas of a defined set of roads (as defined in 1990). Tele2/Telenor requested those coverage requirements to be abolished and be replaced with conditions allowing them to use its portfolio of mobile band spectrum and various mobile technologies such as GSM, UMTS/HSPA and in the future LTE to provide the required coverage.<sup>12</sup>

PTS' proposal, draft license published:

- License renewal for 2X10 MHz of contiguous bandwidth for Tele2/Telenor/TeliaSonera. More technology neutral and service neutral usage rights. 15 years duration; from 1 January 2013 to 31 December 2027.
- Tele2/Telenor/TeliaSonera: usage right for the existing 2X21 MHz/2X18.4 MHz/2X23 MHz of non-contiguous bandwidth to be prolonged until 31 December 2012 and

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<sup>12</sup> <http://www.pts.se/upload/Remisser/2009/1800-tele2-remiss-09-6991-091208.pdf> and <http://www.pts.se/upload/Remisser/2009/1800-telenor-remiss-09-7795-091208.pdf>

existing terms and conditions to apply except from the indoor only restrictions for the three 2X3 MHz blocks of spectrum which would be lifted immediately.

Outcome for Tele2:

- Until 31 December 2012; usage right of 2x21 MHz of non-contiguous bandwidth prolonged.
- From 1 January 2013; to be assigned 2X10 MHz of contiguous bandwidth. Expiry by 31 December 2027. The GSM-only restriction to be lifted so that the licensee may deploy mobile technologies that can co-exist with GSM (within the boundary of legally binding technical harmonisation instruments of the EU).

Outcome for Telenor:

- Until 31 December 2012; usage right of 2x18.4 MHz of non-contiguous bandwidth prolonged.
- From 1 January 2013; to be assigned 2X10 MHz of contiguous bandwidth. Expiry by 31 December 2027. The GSM-only restriction to be lifted so that the licensee may deploy mobile technologies that can co-exist with GSM (within the boundary of legally binding technical harmonisation instruments of the EU).

Outcome for TeliaSonera:

- Until 31 December 2012; usage right of 2x23 MHz of non-contiguous bandwidth prolonged.
- From 1 January 2013; to be assigned 2X10 MHz of contiguous bandwidth. Expiry by 31 December 2027. The GSM-only restriction to be lifted so that the licensee may deploy mobile technologies that can co-exist with GSM (within the boundary of legally binding technical harmonisation instruments of the EU).

### **iii. PTS reasoning for their proposed decisions**

The renewal proposal for 2X10 MHz of contiguous bandwidth was based on a report by external consultants commissioned by PTS and outlining the need for 1800 MHz band spectrum for continuing providing GSM services.<sup>13</sup> The conclusion of the report was that the 1800 MHz band was a complementary resource for providing capacity in addition to core resources in lower bands, the 900 MHz band, and not a resource that any existing operations were depending critically on for providing GSM services. Under the Swedish legal framework license renewal may happen for licensees who have an on-going business providing services that are defined as important for the Swedish society and provided the use of frequencies under the renewed license would meet the criteria of (economically) efficient use of the frequency resource.

The Swedish legal framework and PTS policy promotes the principles of more technology neutral approach and a service neutral approach to designing spectrum usage rights. As parts of the reasoning behind the proposal on lifting the GSM only restrictions the PTS refers

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<sup>13</sup> Netlight Consulting AB, Behov av spektrum i 1800 MHz-bandet för drift av GSM-nät, september 2009

to EU Directive 2009/114 amending Council Directive 87/372 leading to lifting of the GSM only restrictions in the 900 MHz band throughout the EU and to EU Decision 2009/766 which requires EU Member States to allow deployment of GSM, UMTS and other technologies that co-exist with GSM and UMTS in the 900 MHz and 1800 MHz bands. The technical harmonisation imposed by the EU Decision 2009/766 would also mean PTS harmonising the technical definition of the usage rights and PTS stated the technical definitions would be adjusted should the on-going EU/CEPT based technical harmonisation work so require.

#### **iv. The consultation responses**

PTS have published a summary of the consultation responses they received.<sup>14</sup>

PTS received 10 responses; the four incumbents in the 1800 MHz band all responded (Spring Mobil GSM AB, Tele2 AB, Telenor Sverige AB, TeliaSonera Mobile Networks AB) and six interested parties did respond too (Försvarets radioanstalt, Hi3G Access AB, AINMT Sverige AB, MIC Nordic AB, Nordisk Mobiltelefon International AB, TDC Sverige AB).

The 1800 MHz band incumbents:

- Spring Mobil's main concerns were the PTS proposal on rejecting their application for renewal of their license to synchronize the expiry date for all 1800 MHz band licensees and advocating PTS implementing the technical definitions of the usage rights so they could utilize their full 2X5 MHz bandwidth and not use any bandwidth as guardband.
- Tele2's main concern was the PTS proposal on reducing their bandwidth to 2X10 MHz. Tele2 disagreed with the assumption of decreasing GSM traffic leading to reduced need for bandwidth for them to continue their GSM services offerings based on use of the 1800 MHz band spectrum.
- Telenor did support the PTS decision on assigning same amount of spectrum, 2X10 MHz, to the three incumbents when renewing their licenses for the 1 January 2013 to 31 December 2027 term. Furthermore, Telenor did accept the proposal of expanding Spring Mobil's bandwidth so they would end up with 2X5 MHz from 1 January 2013.
- TeliaSonera did regret the PTS decision on assigning same amount of spectrum, 2X10 MHz, to the three incumbents and not deciding upon bandwidth per operator on individual basis and according to their traffic volumes and individual needs for continuing their GSM services offerings based on the 1800 MHz band spectrum. TeliaSonera did point at their larger traffic volumes and did advocate the reduced bandwidth for the renewed licenses had to lead to PTS ensuring they could bid for additional 1800 MHz bandwidth in the announced auction.

Other interested parties:

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<sup>14</sup> In Swedish: <http://www.pts.se/upload/Remisser/2009/1800-remissammanstallning-100201.pdf>

- AINMT Sverige AB did advocate the two year prolongation of the existing licenses for the incumbents to be able to adjust and reconfigure their networks was too generous.
- Försvarets radioanstalt (Swedish Defence) did require terms and conditions implemented to protect their use of radio frequencies from the mobile operator's use of the 1800 MHz band. This was of particular importance for them in six defined geographical areas.
- HI3G Access AB was satisfied with the PTS proposal on limiting the renewal of licenses for the next term to cover 2X10 MHz of bandwidth per licensee and would support this provided the upcoming auction would be designed and implemented so that others than the incumbents may bid and that PTS did impose an appropriate spectrum cap for the auction.
- MIC Nordic AB did request an opportunity to provide GSM instead of DECT in the 1800 MHz band to facilitate customer's implementation of their own mobile infrastructure similar to what they can do with DECT.
- Nordisk Mobiltelefon International AB did advocate that license renewal should only happen in cases where the bandwidth was required for continuing GSM service offerings and they question whether that was the case with Spring Mobil.
- TDC Sverige AB did question whether PTS had sufficiently analysed the consequences of their proposed decisions, in particular in terms of the opportunities for new entry into the band, the impact on competition in end user markets and the international context. TDC's primary view was that the full bandwidth of the 1800 MHz band should have been re-auctioned, and in the case of the proposed renewals did happen, the incumbents in the 1800 MHz band should not have been allowed to participate in the auction.

#### 4. 2010: decision

On 19 February 2010 PTS did announce their decision on renewing the 1800 MHz band licenses.<sup>15</sup> The decision on renewing the licenses were based on operators continuing to provide GSM services was important for the Swedish society, would constitute the efficient use of the frequency resources and on this basis the Swedish legal framework did allow PTS to renew the spectrum usage rights of the 1800 MHz band incumbents.

The PTS decision was in line with the proposal published for the public consultation:

- PTS did uphold their proposals in terms of bandwidth per licensee and assigned 2X10 MHz per operator to Tele2, Telenor and TeliaSonera and 2X5 MHz to Spring Mobil.
- Duration of the renewed licenses for Tele2, Telenor and TeliaSonera was set to 1 January 2013 with expiry 31 December 2027.
- The renewed licenses was issued as more technology neutral and service neutral in accordance with the applicable EU law; the 1800 MHz band may be used for GSM and UMTS and mobile technologies that can co-exist with those technologies from 1 January 2013.
- Spring Mobil's request on renewing their license with expiry 31 May 2017 was rejected while their bandwidth was expanded so they would have a 2X5 MHz usage right with a 1 January 2013 to 31 May 2017 duration.
- The existing licenses of all four incumbents in the 1800 MHz band were prolonged until 31 December 2012.

In addition to altering the coverage requirements as proposed by PTS for the public consultation PTS also decided to remove the requirement on licensees to provide services within two years after the frequencies were assigned (the renewed licenses were for on-going operations of publicly available mobile services and requirements on providing services considered irrelevant in this situation).

As a consequence of the request put forward by Försvarets radioanstalt (Swedish Defence) in their consultation response PTS did impose an additional condition in the renewed usage rights which require licensees to obtain consent from Försvarets radioanstalt if establishing base stations within seven defined geographical areas of Sweden (capital area Stockholm and other larger cities not included).

PTS also made sure the 1800 MHz band licensees were aware of the authorisation to use 1800 MHz band frequencies for provision of GSM on vessels services sailing in Swedish territorial sea, an authorisation issued on a non-interference basis (and in accordance with an EU harmonised approach).

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<sup>15</sup> In Swedish: <http://www.pts.se/sv/Nyheter/Radio/2010/PTS-fornyar-tillstand-i-1800-MHz-bandet/> English translation not available from PTS.

PTS published the renewed licenses on 19 February 2010: Tele2<sup>16</sup>, Telenor<sup>17</sup> and TeliaSonera<sup>18</sup> and the decision on prolonging the license conditions for Spring Mobil<sup>19</sup>.

Finally, at the same day in February 2010 PTS announced the second public consultation meeting addressing the 1800 MHz auction preparations for assigning the 2X40 MHz of bandwidth that would be vacant 1 January 2013 and that second public consultation meeting was scheduled for 9 March 2010.<sup>20</sup>

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<sup>16</sup> <http://www.pts.se/sv/Dokument/Beslut/Sppektrum/2010/Beslut-om-fornyade-tillstand-i-1800-MHz-bandet-for-Tele2---09-6991/>

<sup>17</sup> <http://www.pts.se/sv/Dokument/Beslut/Sppektrum/2010/Beslut-om-fornyade-tillstand-i-1800-MHz-bandet-for-Telenor---09-7795/>

<sup>18</sup> <http://www.pts.se/sv/Dokument/Beslut/Sppektrum/2010/Beslut-om-fornyade-tillstand-i-1800-MHz-bandet-for-Telia-Sonera---09-6596/>

<sup>19</sup> <http://www.pts.se/sv/Dokument/Beslut/Sppektrum/2010/Beslut-om-forlangning-av-tillstandstid-for-tillstand-i-1800-MHz-bandet-for-Spring-Mobil---09-10246/>

<sup>20</sup> <http://www.pts.se/sv/Nyheter/Radio/2010/PTS-bjuder-in-till-ett-andra-informationsmote-om-auktionen-i-1800-MHz-bandet/>

## 5. 2011: 1800 MHz band auction

PTS intention was to auction the 2X40 MHz of 1800 MHz band spectrum by second half of 2010. Because of a complaint filed on the decision on renewing incumbent's licenses the auction was postponed until the outcome of the complaint case was published. The auction happened in October 2011.

### a. 2009-2010: public consultation meetings on auction preparations

PTS did host two public consultation meetings in Stockholm addressing auction preparation process and where interested parties were given the opportunity to express their views.

The 18 December 2009 meeting<sup>21</sup>:

- The meeting lasted for three hours and on the agenda was the question of timing for the auction, spectrum cap, duration of licenses, auction design and update on international harmonisations work relevant for the future use of the 1800 MHz band.
- After the public consultation meeting PTS uploaded the presentation<sup>22</sup> they used to their website and interested parties were invited to comment in written on the proposals discussed at the meeting.
- PTS did receive nine written consultation responses; Absolute Mobile<sup>23</sup>, HI3G Access<sup>24</sup>, Ice.net<sup>25</sup>, MicNordic<sup>26</sup>, NMTI<sup>27</sup>, SKEF<sup>28</sup>, TDC Sverige<sup>29</sup>, Telenor<sup>30</sup> and TeliaSonera<sup>31</sup>.

The 9 March 2010 meeting<sup>32</sup>:

- The meeting lasted for two hours and on the agenda was the license design (lots plan for the auction, technical conditions, duration), auction design/implementation and spectrum cap.

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<sup>21</sup> In Swedish: <http://www.pts.se/sv/Nyheter/Radio/2009/PTS-bjuder-in-till-hearing-om-framtida-tilldelning-i-1800-MHz-bandet/>

<sup>22</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/1800mhz-presentation-hearing-091218.pdf> English translation not available from PTS

<sup>23</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/synpunkter-absolute-mobile-1800.pdf>

<sup>24</sup> In English: <http://www.pts.se/upload/Ovrigt/Radio/3-synpunkter-1800.pdf>

<sup>25</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/remissvar-ice-net.pdf>

<sup>26</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/synpunter-MicNordic-1800.pdf>

<sup>27</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/synpunkter-nmti-1800.pdf>

<sup>28</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/SKEF-1800.pdf>

<sup>29</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/synpunkter-tdc-sverige-1800bandet.pdf>

<sup>30</sup> In Swedish: [http://www.pts.se/upload/Ovrigt/Radio/Telenor-yttrande\\_1800\\_auktion.pdf](http://www.pts.se/upload/Ovrigt/Radio/Telenor-yttrande_1800_auktion.pdf)

<sup>31</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/synpunkter-ts-1800.pdf>

<sup>32</sup> In Swedish: <http://www.pts.se/sv/Nyheter/Radio/2010/PTS-bjuder-in-till-ett-andra-informationsmote-om-auktionen-i-1800-MHz-bandet/>

- After the public consultation meeting PTS did upload the presentation<sup>33</sup> they used to their website and interested parties were invited to comment in written on the proposals discussed at the meeting.
- PTS received sixteen written consultation responses from fifteen contributors; Absolute Mobile<sup>34</sup>, BXO solutions<sup>35</sup>, Eltel Networks Infranet AB<sup>36</sup>, HI3G Access<sup>37</sup>, Ice.net<sup>38</sup>, Intensa<sup>39</sup>, Konkurrensverket (competition authorities)<sup>40</sup>, Kuntze Communication<sup>41</sup>, MicNordic<sup>42</sup>, NMTI<sup>43</sup>, Tele2<sup>44</sup>, Telenor<sup>45</sup>, TeliaSonera<sup>46</sup>, Tre Innovatorer<sup>47</sup> and Örebro läns landsting<sup>48</sup>.
- PTS published a summary of the consultation responses received and their comments to those.<sup>49</sup>

On 31 May 2010 PTS did publish their draft auction rules, an overview of applicable fees and their draft decision on spectrum caps for the 1800 MHz band.<sup>50</sup> At this stage of the drafting and consultation process PTS did receive and did publish four consultation responses; the three incumbents Tele2, Telenor and TeliaSonera and from TDC Sverige.<sup>51</sup> On 25 August 2010 PTS did publish their response to the four consultation responses.<sup>52</sup>

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<sup>33</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/Hearing2-1800MHz-bandet-100309.pdf>

<sup>34</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-absolute-mobile.pdf>

<sup>35</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-bxo-solutions.pdf>

<sup>36</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-eltel-networks-infranet.pdf>

<sup>37</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-hi3g.pdf>

<sup>38</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-icenet.pdf>

<sup>39</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-intensa.pdf>

<sup>40</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-KKV.pdf>

<sup>41</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-kuntze-communication.pdf>

<sup>42</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-mic-nordic.pdf>

<sup>43</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-nmti.pdf>

<sup>44</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-tele2.pdf>

<sup>45</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-telenor.pdf> and <http://www.pts.se/upload/Ovrigt/Radio/1800-telenor-kompletterande-synpunkter-100426.pdf>

<sup>46</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-telia.pdf>

<sup>47</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-tre-innovatorer.pdf>

<sup>48</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-synpunkter-orebro-lans-landsting.pdf>

<sup>49</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100423-pts-kommentarer.pdf>

<sup>50</sup> In Swedish: [http://www.pts.se/sv/Dokument/Remisser/2010/Remiss---Allman-inbjudan-till-ansokan-om-tillstand-att-anvanda-radiosandare-i-1800-MHz-bandet-/](http://www.pts.se/sv/Dokument/Remisser/2010/Remiss---Allman-inbjudan-till-ansokan-om-tillstand-att-anvanda-radiosandare-i-1800-MHz-bandet/)

<sup>51</sup> In Swedish: [http://www.pts.se/sv/Dokument/Remisser/2010/Remiss---Allman-inbjudan-till-ansokan-om-tillstand-att-anvanda-radiosandare-i-1800-MHz-bandet-/](http://www.pts.se/sv/Dokument/Remisser/2010/Remiss---Allman-inbjudan-till-ansokan-om-tillstand-att-anvanda-radiosandare-i-1800-MHz-bandet/)

<sup>52</sup> In Swedish: <http://www.pts.se/upload/Ovrigt/Radio/100825-pts-kommentarer.pdf>



## **b. 2010: auction postponed**

On 3 September 2010 PTS did announce that the auction would be postponed because of on-going legal processes regarding complaint cases related to the decisions on renewal of incumbents 1800 MHz band licenses creating uncertainty.<sup>53</sup>

## **c. General authorisation for certain uses of the upper part of the 1800 MHz band**

On 15 April 2011 PTS published information about their plans on issue general authorisation for certain use of the frequency band 1878.1-1880 MHz for the next revision of the Swedish Regulation on general authorisations to use radio frequencies.<sup>54</sup>

Following those adjustments PTS ended up with auctioning off 2X35 MHz of the 1800 MHz spectrum (reduced from the 2X40 MHz that was included in the initial phase of planning the auction).

## **d. 2011: auction process re-started and adjustments of the auction rules announced**

On 26 May 2011 PTS announced the complaint cases related to renewing the incumbents 1800 MHz band licenses were sorted and they were planning to schedule the auction of 2X35 MHz bandwidth in the 1800 MHz band for the 2011 autumn.

In the 26 May 2011 announcement PTS did also state that they were planning to move forward with a two stage auction design of first round for allocating the bandwidth between bidders and second round for bidding on spectrally placing the winning bidders of first round.<sup>55</sup>

On 26 May 2011 PTS also did announce they would not implement a spectrum cap, no coverage and roll-out requirements would be imposed and the duration of the licenses would be 25 years.<sup>56</sup>

## **e. 2011: auction invitation published**

On 1 June 2011 PTS published the open invitation to participate in the auction.<sup>57</sup> It became clear that the PTS would use a clock auction format where first stage was about bidding for amount of spectrum, generic bandwidth, whereas the second stage of the auction would be about bidding for spectrally placing of the usage rights. The second stage would include the winning bidders from stage one of the auction *and* the incumbent licensees with renewed

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<sup>53</sup> In Swedish: <http://www.pts.se/sv/Nyheter/Radio/2010/PTS-avvaktar-med-auktion-i-1800-MHz-bandet/>

<sup>54</sup> In Swedish: <http://www.pts.se/sv/Bransch/Radio/Auktioner/Ansokan-tillstand-1800-MHz-bandet/> and <http://www.pts.se/sv/Dokument/Remisser/2010/Remiss-av-foreskrifter-om-undantag-fran-tillstandsplikt-for-vissa-radiosandare---10-6793/>

<sup>55</sup> <http://www.pts.se/sv/Nyheter/Radio/2011/PTS-planerar-for-auktion-i-1800-MHz-bandet-till-hosten/>

<sup>56</sup> <http://www.pts.se/sv/Nyheter/Radio/2011/PTS-planerar-for-auktion-i-1800-MHz-bandet-till-hosten/>

<sup>57</sup> <http://www.pts.se/en-gb/Documents/Decisions/Radio/2011/Beslut-om-begransning-av-antalet-tillstand-i-1800-MHz-bandet-och-allman-inbjudan/>

licenses that would come into force 1 January 2013 meaning all firms that would be 1800 MHz band licensees after 1 January 2013 would be “qualified” to bid for spectrally placing their usage rights. Consequently, second stage of the auction was used to determine the reconfiguration of the 1800 MHz band applicable from 1 January 2013.

The 2X35 MHz of bandwidth up for sale in the auction was divided into 2X5 MHz lots for the auction. Since no spectrum cap did apply bidders could add up lots when bidding for generic bandwidth in the first stage of the auction.

The deadline for submitting application to register as bidder in the auction of 2X35 MHz of bandwidth was set to 2 September 2011 and it was announced that PTS were aiming at kicking off the auction on 11 October 2011.

On 12 August 2011 PTS announced that the reservation price was set to SEK 10 000 000 (approximately EUR 1,100,300) per 2X5 MHz lot.

#### **f. 2011: transfer of 1800 MHz band licenses approved by PTS**

On 15 August 2011 PTS announced that they had approved the transfer of Tele2, Telenor and Spring Mobil’s existing 1800 MHz band usage rights to Net4Mobility. Net4Mobility is a network company owned in equal parts by Tele2 and Telenor. The PTS approval of the transfer of the renewed licenses was a result of the application put forward by Tele2 and Telenor on 1 July 2011 which was about the two renewed licenses, each comprising 2X10 MHz of bandwidth that would come into force on 1 January 2013. Spring Mobil is fully owned by Tele2 and their 2X5 MHz license in the 1800 MHz band with a 1 January 2013 to 31 May 2017 duration was also included in the transaction. After the transaction was completed Net4Mobility will control 2X25 MHz of bandwidth in the 1800 MHz band from 1 January 2013 and Tele2, Telenor and Spring Mobil will no longer be 1800 MHz band licensees after 31 December 2012.<sup>58</sup>

This transfer and the PTS approval of it paved the way for Net4Mobility registering as the bidder for buying additional 1800 MHz spectrum that Tele2 and Telenor seems to be likely to use for providing 1800 MHz band based mobile broadband services in the future.

#### **g. 2011: auction**

On 8 September 2011 PTS confirmed the auction would go ahead as planned.

The auction kicked off 11 October 2011. Stage one of the auction, the bidding for generic bandwidth stage, lasted for four days. The transparency of participating bidders was restricted while the auction was going on. PTS published a report on number of bidding rounds and overview of how prices raised at the end of each day of bidding.<sup>59</sup>

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<sup>58</sup> In Swedish: <http://www.pts.se/sv/Nyheter/Radio/2011/PTS-godkanner-overlatelse-av-frekvenser-i-1800-MHz-bandet/>

<sup>59</sup> <http://www.pts.se/en-gb/Industry/Radio/Auctions/Ansokan-tillstand-1800-MHz-bandet/>

At the end of stage one of bidding PTS did announce the preliminary results (at this stage PTS loosened the restrictions on information published):

- TeliaSonera Mobile Networks AB did win five lots, 2x25 MHz of bandwidth, at a price of SEK 919,999,999 (approximately EUR 101,215,700).
- Net4Mobility HB did win two lots, 2x10 MHz of bandwidth, at a price of SEK 430,000,000 (approximately EUR 47,323,500).
- Hi3G Access AB participated in the auction but did not win any lots.

On 17 October 2011 the second stage of the auction did kick off. This stage was designed to determine the spectral placing of the winners of the first stage of the auction *and* of the incumbents that had their licenses renewed for the term 1 January 2013 to 31 December 2027 prior to the auction. In other words, the second stage of the auction was used for determining the reconfiguration of the 1800 MHz band that would apply from 1 January 2013. For the second stage of the auction Net4Mobility and TeliaSonera were the qualified bidders. In the second stage of the auction (the Vickrey stage), both bidders got their first choice of spectral position, resulting in a total bid sum of 0. So the second stage of the auction did not raise the total price paid for the spectrum.

None of the bidders raised their bids in the second stage of the auction (no willingness to pay for securing a specific spectral placing, contiguous bandwidth was already secured for the bidders/the 1800 MHz band licensees).

#### **h. 2011: auction results**

Final results of the SWE 1800 MHz band auction:

- Net4Mobility paid SEK 430 000 000 for 2x10 MHz (price/pops/MHz of SEK 2.36 or EUR 0.26). After the license renewal process and the approval of trading agreement where Tele2 and Telenor sold their renewed 1800 MHz band spectrum to Net4Mobility and the auction Net4Mobility controls 2X35 MHz in the 1800 MHz band from 1 January 2013.
- TeliaSonera Mobile Networks AB paid SEK 919 999 999 for 2x25 MHz (price/pops/MHz of SEK 2.02 or EUR 0.22). After the license renewal and the auction TeliaSonera controls 2X35 MHz in the 1800 MHz band from 1 January 2013.

The total auction revenue for the 2X35 MHz sold was SEK 1,349,999,999 (approx. EUR 148 million).

Upon conclusion of the auction on 17 October 2011 PTS issued a press release announcing the auction results.<sup>60</sup>

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<sup>60</sup> <http://www.pts.se/en-gb/News/Press-releases/2011/Auction-concluded/>

## 2011: the license renewal and the auction reforms and reconfigures the 1800 MHz band from 1 January 2013

On 17 October 2011 PTS published its decision on assigning licenses according to the auction results.<sup>61</sup> This is the assignment of licenses that will apply from 1 January 2013:

Frequency block	Uplink band	Downlink band	Licensee
1	1710–1715	1805–1810	TeliaSonera Mobile Networks AB
2	1715–1720	1810–1815	TeliaSonera Mobile Networks AB
3	1720–1725	1815–1820	TeliaSonera Mobile Networks AB
4	1725–1730	1820–1825	TeliaSonera Mobile Networks AB
5	1730–1735	1825–1830	TeliaSonera Mobile Networks AB
6	1735–1740	1830–1835	TeliaSonera Mobile Networks AB
7	1740–1745	1835–1840	TeliaSonera Mobile Networks AB
8	1745–1750	1840–1845	Net4Mobility HB
9	1750–1755	1845–1850	Net4Mobility HB
10	1755–1760	1850–1855	Net4Mobility HB
11	1760–1765	1855–1860	Net4Mobility HB
12	1765–1770	1860–1865	Net4Mobility HB
13	1770–1775	1865–1870	Net4Mobility HB
14	1775–1780	1870–1875	Net4Mobility HB

To sum up: from 1 January 2013 Net4Mobility holds the usage right for the bands 1745-1780 / 1840-1875 MHz (2X35 MHz of bandwidth) and TeliaSonera holds the usage right for the bands 1710-1745 / 1805-1840 MHz (2X35 MHz of bandwidth).

The process of reforming the 1800 MHz band into more technology neutral and service neutral spectrum usage rights was completed by October 2011. The usage rights that will apply from 1 January 2013 allow the licensees to deploy GSM/EDGE/GPRS technology, UMTS/HSPA technology and mobile technologies that can technically co-exist with GSM/EDGE/GPRS and UMTS/HSPA. This means that from 1 January 2013 the licensees Net4Mobility and TeliaSonera can deploy technologies such as GSM/EDGE/GPRS, UMTS/HSPA and LTE. The licensees may choose their technology preferences based on their commercial and technology strategies.

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<sup>61</sup> <http://www.pts.se/upload/Beslut/Radio/2011/10-6250-decision-about-licenses-1800%20MHz-20111017.pdf>