

# Agreement between the Norwegian Communications Authority and the Swedish Post and Telecom Authority concerning the use of the 703-733 MHz and 758-788 MHz for DTT service in Norway and MFCN service in Sweden

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June 2016

## Protection of DTT from MFCN and protection of MFCN from DTT

This agreement is valid from 1 April 2017 until Norway changes from DTT to MFCN in the 703-733 and 758-788 MHz band in Norway. Norway will inform Sweden as soon as a final date of the change of service is set.

### 1. Principles and definitions

- 1.1. This agreement covers the frequency intervals 703 - 733 MHz and 758-788 MHz.
- 1.2. The agreement covers the protection of DTT used in accordance with Geneva Agreement 2006 (GE06) from MFCN with the FDD (Frequency Division Duplex) arrangement in accordance with CEPT Report 53 (28 Nov, 2014) and ECC Decision (15)01.
- 1.3. This agreement covers the protection of MFCN from new or previously not coordinated DTT transmitters.
- 1.4. This agreement covers the coordination of MFCN base stations in relation to DTT. The MFCN user equipment, or terminals, are allowed to be used on a non-interference basis.
- 1.5. For this agreement the border is defined as the land border, or where appropriate, a line midway between the Norwegian coastline and the Swedish coastline, due to ratified border agreement between Norway and Sweden.
- 1.6. In this agreement, for assignments the boundary is the calculated noise limited coverage, with the minimum median equivalent field strength corresponding to RPC 1 increased by 3 dB.
- 1.7. This agreement is based on the concept of field strength levels. The power sum method is used for accumulation.
- 1.8. The latest version of ITU-R P.1546 "Method for point-to-area predictions for terrestrial services in the frequency range 30-3000 MHz" shall be used for predictions of field strength values.

## 2. Use of frequencies without coordination by administrations

- 2.1. DTT transmitters may continue to operate and to be implemented in Norway as set out in the GE06, in the bilateral<sup>1</sup>/trilateral<sup>2</sup> agreements and in Annex 1. MFCN shall not claim protection from these DTT transmitters.
- 2.2. MFCN base stations may be implemented in the 703 - 733 MHz and 758-788 MHz frequency bands without coordination in relation to DTT as long as the cumulative interfering field strength is below 34 dB( $\mu$ V/m)/1 MHz, calculated for 1% of the time and 50% of the locations, 10 m above ground, at the boundary of co-channel (overlapping) DTT assignments in the 703-733MHz (CH50 – CH53) and 758-788 MHz (CH57 - CH60) included in the GE06 plan by June 2016 or listed in Annex 1.
- 2.3. New or previously not coordinated DTT transmitters may be implemented in Norway in the 703 - 733 MHz frequency range without coordination with Sweden in relation to MFCN as long as the cumulative interfering field strength is below 36 dB( $\mu$ V/m)/5 MHz, calculated for 10% of the time and 50% of the locations, at a height of 1.5 m above the ground at the Swedish border or beyond.
- 2.4. New or previously not coordinated DTT transmitters may be implemented in Norway in the 758-788 MHz frequency range without coordination with Sweden in relation to MFCN as long as the cumulative interfering field strength is below 54 dB( $\mu$ V/m)/5 MHz, calculated for 10% of the time and 50% of the locations, at a height of 1.5 m above the ground at the Swedish border or beyond.
- 2.5. In case of using technologies with other channel bandwidths (BW) than 5 MHz, the predicted field strength E shall be adjusted by a factor in comparison with  $E_0$  as in paragraphs 2.3:  
 $E = E_0 + 10 \cdot \log_{10}(BW/5)$ , where BW is measured in MHz.
- 2.6. In case of using antenna heights other than those given above, the predicted field strength E shall be adjusted by a gain factor of:  $E = E_0 + (4/6) \cdot 20 \cdot \log_{10}(h/h_0)$ .

## 3. Coordination procedure

- 3.1. Establishment of agreements between operators shall be encouraged to the extent possible. Subject to agreement between operators other technical characteristics can be used, e.g. other field strength limits or propagation models.
- 3.2. Any case of interference shall as far as possible be resolved among operators concerned. If not resolved, or in case of unequal access to the spectrum band, assistance might be sought from the administrations.

## 4. Revision and cancellation

- 4.1. This agreement may be revised upon mutual agreement of the two administrations.
- 4.2. This agreement may be cancelled with a notice of at least twelve months from any of the two parties.

This agreement is valid until Norway changes from DTT to MFCN in the 703 - 733 MHz and 758-788 MHz frequency bands

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<sup>1</sup> Agreement between Norway and Sweden concerning the use of the broadcast band planned at the RRC 2006 conference, signed June 2006

<sup>2</sup> Coordination agreement relating to DTT services in the UHF-Band in Denmark-Sweden-Norway, signed April 2011

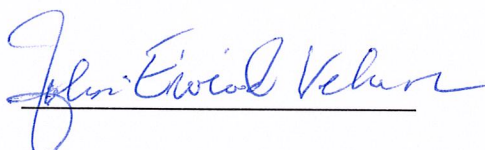
## 5. Enter into force

5.1. This agreement shall enter into force 1 April, 2017.

This agreement has been drawn in two identical copies, one for Norway and one for Sweden.

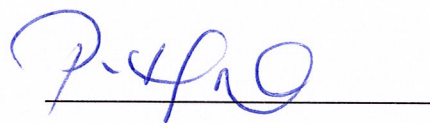
Place *Stockholm*  
Date *16 June 2016*  
For the Norwegian Communications Authority

Place *Stockholm*  
Date *16 June 2016*  
For the Swedish Post and Telecom Authority



John-Eivind Velure

Director of the Frequency Management Department



Pia Högset

Head of Section for Spectrum Development

Spectrum Department, PTS

## ANNEX 1 – List of DTT transmitters in Norway

	SFN areas						Transponders				
	MUX1	MUX2	MUX3	MUX4	MUX5		MUX1	MUX2	MUX3	MUX4	MUX5
<b>Halden</b>	32	42	21	38	45						
Viktjernåsen	32	42	21	38	45						
Ørje fort	32	42	21	38	45						
Toåsen	52	58	46	30	40	57					
<b>Tryvasshøgda</b>	52	58	46	30	40	57					
Furuset	52	58	46	30	40	57					
Ski						57					
Lommedalen	52	58	46	30	40						
Maura	52	58	46	30	40						
Mistberget	52	58	46	30	40						
Nittedal	52	58	46	30	40						
<b>Kongsvinger</b>	24	48	55	28	41						
Flisa	24	48	55	28	41						
Oppstad	24	48	55	28	41						
Skotterud	24	48	55	28	41						
<b>Bangsberget</b>	23	29	35	47	60						
Biri	23	29	35	47	60						
Raufoss 2	23	29	35	47	60						
Skreia	23	29	35	47	60						
Snertingdal 1	23	29	35	47	60						
Snertingdal 2							34	54	57	44	49
<b>Nordhøe</b>	33	43	56	27	31						
Follebu	33	43	56	27	31						
Koppang	33	43	56	27	31						
Lillehammer	33	43	56	27	31						
Trysilfjell	33	43	56	27	31						
Vestre Gausdal	33	43	56	27	31						
Østre Gausdal 1	33	43	56	27	31						
Øyer 1	33	43	56	27	31						
Åsmarka	33	43	56	27	31						
<b>Bagn</b>	32	39	42	22	59						
Bjørkerudberget							36	44	46	54	27
Brufat 1	32	39	42	22	59						
Dokka	32	39	42	22	59						
Fagernes 2							28	51	54	30	37
Felle	32	39	42	22	59						
Hedalen 1							34	51	54	45	57
Heggenes	32	39	42	22	59						
Hov i Land	32	39	42	22	59						

Vangsmjøsa 1							32	39	42	22	59
Vestre Slidre							46	54	36	55	34
<b>Tron</b>	26	34	49	23	40						
Brandvoll							36	44	54	28	31
Folldal							21	37	56	46	59
Gløtvola	26	34	49	23	40						
Åkersten	26	34	49	23	40						
Hommelfjell	29	35	38	22	39						
<b>Jetta</b>	45	48	58	41	51						
Fåvang	45	48	58	41	51						
Kvam 1	45	48	58	41	51						
Lesja							28	39	54	36	22
Lom 1	45	48	58	41	51						
Lom 2							28	39	43	36	22
Otta							32	38	57	46	44
Ringebu 1	45	48	58	41	51						
Sel 1	45	48	58	41	51						
Skjåk 1							27	32	36	23	29
Skjåk 3	45	48	58	41	51						
Tretten 1	45	48	58	41	51						
Vinstra 1	45	48	58	41	51						
Vågå	45	48	58	41	51						
<b>Gran</b>	38	57	55	36	45						
Bjoneroa	38	57	55	36	45						
Harestua	38	57	55	36	45						
Jevnaker 2	38	57	55	36	45						
Lunner 1	38	57	55	36	45						
<b>Gol 1</b>	47	52	55	26	29						
Flå 1	47	52	55	26	29						
Geilo 2	47	52	55	26	29						
Gol 2	47	52	55	26	29						
Hol 2							38	45	53	34	28
Nesbyen							38	45	53	34	28
Ål	47	52	55	26	29						
<b>Ringerike</b>	23	31	49	41	33						
Hallingby	24	31	49	28	33						
Norefjell	24	31	49	28	33						
Sokna	24	31	49	28	33						
Sollihøgda	24	31	49	28	33						
<b>Kongsberg</b>	60	34	51	43	44						
Eggedal 1	60	34	51	43	44						
Hvittingfoss	60	34	51	43	44						
Kongsberg 2	60	34	51	43	44						
Lierskogen	60	34	51	43	44						

Nordbykollen	60	34	51	43	44						
Rødberg	60	34	51	43	44						
Sauherad 1	60	34	51	43	44						
Sigdal	60	34	51	43	44						
Solbergåsen	60	34	51	43	44						
Øvre Eiker	60	34	51	43	44						
Hvitingen	60	34	59	43	44						
Frodeåsen Tele	60	34	59	24	44						
Sandefjord	60	47	36	24	44						
Larvik	60	47	36	24	44						
Brattås LTV	60	47	36	24	44						
<b>Skien</b>	60	34	54	24	44						
Drangedal	60	34	54	24	44						
Herre	60	34	54	24	44						
Høgenhei	60	34	54	24	44						
Lifjell	60	34	54	24	44						
Porsgrunn	60	34	54	24	44						
Ulefoss	60	34	54	24	44						
<b>Gausta</b>	25	27	35	32	42						
Fyresdal 1	25	27	35	32	42						
Grungedal 1	25	27	35	32	42						
Kviteseid 1	25	27	35	32	42						
Lisleherad							22	29	39	53	56
Mæl							38	45	29	52	54
Notodden	25	27	35	32	42						
Rauland	25	27	35	32	42						
Rjukan							55	57	59	44	46
Sauland	25	27	35	32	42						
Seljord 2	25	27	35	32	42						
Ytre Vinje	25	27	35	32	42						
<b>Fennefossknipa</b>	26	39	31	28	45						
Homme	26	39	31	28	45						
Valle							44	57	37	42	23
<b>Hovdefjell</b>	41	52	48	55	58						
Arendal	41	52	48	55	58						
Birkeland	41	52	48	55	58						
Blakstad i Froland 1	41	52	48	55	58						
Fevik 2	41	52	48	55	58						
Gjerstad 2	41	52	48	55	58						
Grimstad	41	52	48	55	58						
Lillesand	41	52	48	55	58						
Ranvikheia	41	52	48	55	58						
Søndeled 1	41	52	48	55	58						
Tvedestrand	41	52	48	55	58						

Tveithea	41	52	48	55	58					
Åmdal	41	52	48	55	58					
<b>Greipstad</b>	51	54	47	36	60					
Hamresanden	51	54	47	36	60					
Hortemo	51	54	47	36	60					
Kristiansand	51	54	47	36	60					
Mandal	51	54	47	36	60					
Mosby	51	54	47	36	60					
Søgne	51	54	47	36	60					
Vennesla	51	54	47	36	60					
<b>Lyngdal</b>	25	53	47	32	33					
Eiken 2	25	53	47	32	33					
Farsund	25	53	47	32	33					
Farsund 1						28	38	50	56	59
Flekkefjord 1	25	53	47	32	33					
Lyngdal 2	25	53	47	32	33					
Noneskardknuten	25	53	47	32	33					
Sira 1	25	53	47	32	33					
Søylandsdalen						22	38	50	56	59
Tonstad	25	53	47	32	33					
Vanse	25	53	47	32	33					
Viblemo	25	53	47	32	33					
Vigeland	25	53	47	32	33					
<b>Bjerkreim</b>	23	26	30	27	34					
Egersund	23	26	30	27	34					
Hauge i Dalane	23	26	30	27	34					
Moi	23	26	30	27	34					
Oltedal	23	26	30	27	34					
Ålgård	23	26	30	27	34					
Lifjell Stavanger	31	26	45	51	41					
<b>Bokn</b>	36	54	57	44	35					
Sand 1	36	54	57	44	35					
Sandeid 1	36	54	57	44	35					
Sauda	36	54	57	44	35					
Ølen 1	36	54	57	44	35					
<b>Stord</b>	55	58	60	47	50					
Etne 1	55	58	60	47	50					
Fitjar	55	58	60	47	50					
Husnes						22	28	32	24	52
Rosendal 1	55	58	60	47	50					
Sagvåg 1						22	28	32	24	52
Skånevik 2						21	27	34	38	26
Uskedal	55	58	60	47	50					
<b>Bergen</b>	33	49	39	43	53					

Alversund							21	24	36	30	59
Borgafjell	33	49	39	43	53						
Bruvik	33	49	39	43	53						
Dalekvam							25	28	30	34	36
Dalekvam 2	33	49	39	43	53						
Frekhaug	33	49	39	43	53						
Haus	33	49	39	43	53						
Knappfjell	33	49	39	43	53						
Laksevåg	33	49	39	43	53						
Langhelle	33	49	39	43	53						
Lonevåg 2	33	49	39	43	53						
Samnanger	33	49	39	43	53						
Seim							24	45	59	32	48
Skåldalen	33	49	39	43	53						
Stanghelle	33	49	39	43	53						
Åsane 1	33	49	39	43	53						
Åsane 2	33	49	39	43	53						
<b>Grimo</b>	48	52	39	45	54						
Børve							26	28	36	32	42
Eidfjord	48	52	39	45	54						
Odda 1	34	38	24	22	30						
Odda 2							43	49	51	56	33
<b>Lønahorgi</b>	31	41	44	46	54						
Granvin 1	31	41	44	46	54						
Jondal 1	31	41	44	46	54						
Kvamsøy i Hordaland	31	41	44	46	54						
Kysnesstrand	31	41	44	46	54						
Norheimsund	31	41	44	46	54						
Ulvik 1	31	41	44	46	54						
Ulvik 2							26	29	36	49	59
Voss 1	31	41	44	46	54						
Øystese	31	41	44	46	54						
Ålvik	31	41	44	46	54						
<b>Gulen</b>	37	42	26	29	23						
Askvoll							40	44	54	24	47
Dale 1	37	42	26	29	23						
Høyanger 2	37	42	26	29	23						
Lavik 2	37	42	26	29	23						
Vadheim	37	42	26	29	23						
<b>Bremanger</b>	25	28	31	46	52						
Brandsøy	25	28	31	46	52						
Bremangerpollen							55	42	39	32	34
Deknepollen	25	28	31	46	52						
Måløy							39	42	55	32	34



Selje	25	28	31	46	52						
Stadlandet							56	59	50	47	49
Svelgen 2	25	28	31	46	52						
<b>Nordfjordeid</b>	40	44	33	27	30						
Blakseter							31	43	49	29	56
Byrkjelo							26	29	52	54	46
Hornsnakken	40	44	33	27	30						
Nordfjordeid 2	40	44	33	27	30						
Oppheim							47	50	59	42	55
Ottern							47	50	59	42	55
Sandane 1							47	50	59	42	55
Sandane 2							47	50	59	42	55
Stryn	40	44	33	27	30						
<b>Førde</b>	35	45	48	22	32						
Eikefjord	35	45	48	22	32						
Kvammen	35	45	48	22	32						
Naustdal 2							39	43	50	52	57
Sande 1	35	45	48	22	32						
Skei i Jølster	35	45	48	22	32						
Vassenden	35	45	48	22	32						
<b>Sogndal</b>	21	24	34	38	57						
Bjørgo	21	24	34	38	57						
Gaupne	21	24	34	38	57						
Hermansverk							47	50	52	45	55
Kaupanger	21	24	34	38	57						
Luster	21	24	34	38	57						
Vangsnes							36	40	59	30	43
Vik 2	21	24	34	38	57						
Årdal 1							23	25	40	47	50
Årdal 2							28	32	36	43	53
Årdal 3	21	24	34	38	57						
<b>Gamlemsveten</b>	37	38	54	24	34						
Brattvåg	37	38	54	24	34						
Fosnavåg 1	37	38	54	24	34						
Geiranger 2	37	38	54	24	34						
Gurskebotn	37	38	54	24	34						
Hareid	37	38	54	24	34						
Hjørungavåg	37	38	54	24	34						
Moltustranda	37	38	54	24	34						
Sjøholt	37	38	54	24	34						
Skodje	37	38	54	24	34						
Spjelkavik	37	38	54	24	34						
Stordal 1	37	38	54	24	34						
Stranda 2	37	38	54	24	34						

Sykkylven							22	26	32	51	47
Syvdsbotn 2	37	38	54	24	34						
Ulsteinvik	37	38	54	24	34						
Valldal 1	37	38	54	24	34						
Velledalen							28	31	41	46	52
Volda 2	37	38	54	24	34						
Ørsta 1	37	38	54	24	34						
Ørsta 2	37	38	54	24	34						
Ålesund	37	38	54	24	34						
<b>Reinsfjell</b>	39	42	35	29	53						
Batnfjord 1	39	42	35	29	53						
Eide							33	25	55	47	59
Eidsvåg 2							33	44	55	47	59
Fjøseid 1	39	42	35	29	53						
Grisvågøy	39	42	35	29	53						
Kleive							48	51	55	25	31
Kristiansund	39	42	35	29	53						
Kvisvik	39	42	35	29	53						
Malmefjord	39	42	35	29	53						
Rindal	39	42	35	29	53						
Sunnalsøra 1	45	51	56	33	47						
Sunnalsøra 2	45	51	56	33	47						
Surnadal							48	56	59	31	51
Tingvollfjord							22	27	32	46	57
Tomrefjord 1	39	42	35	29	53						
Tomrefjord 2							22	26	32	49	47
Tresfjord 1	39	42	35	29	53						
Åndalsnes	39	42	35	29	53						
<b>Hommelfjell M1</b>	42										
<b>Kopparen</b>	26	40	45	23	36						
Myrafjellet							50	54	59	48	38
Stjørnafjord	26	40	45	23	36						
Åfjord	26	40	45	23	36						
<b>Almenberget</b>	31	32	59	24	46						
Berkåk							38	40	50	22	48
Oppdal 1							38	40	54	51	22
<b>Melhus</b>	55	28	25	30	33						
Fannrem	55	28	25	30	33						
Hommelvik							39	42	59	22	35
Hovin i Melhus	55	28	25	30	33						
Kvål	55	28	25	30	33						
Løkken	55	28	25	30	33						
Meldal	55	28	25	30	33						
Selbu 1							22	51	54	59	60

Skaun	55	28	25	30	33					
Støren 1	55	28	25	30	33					
Svorkmo	55	28	25	30	33					
Vardheia	55	28	25	30	33					
Ålen 2	55	28	25	30	33					
Hell	44	47	25	37	41					
Meråker 1	44	47	25	37	41					
<b>Mosvik</b>	44	47	46	37	41					
Borrsåsen	44	47	46	37	41					
Hjellebotn	44	47	46	37	41					
Malm 1	44	47	46	37	41					
Offenåsen	44	47	46	37	41					
<b>Grong</b>	21	31	35	24	34					
Bangsund						28	51	54	42	29
Binde	21	31	35	24	34					
Falkhetta	21	31	35	24	34					
Kolvereid 1	21	31	35	24	34					
Namsskogan 2	21	31	35	24	34					
Nordli	21	31	35	24	34					
Røyrvik	21	31	35	24	34					
Snåsa	21	31	35	24	34					
Spillumsaksla	21	31	35	24	34					
Øyenskvlen	21	31	35	24	34					
<b>Vega</b>	25	32	37	22	28					
Terråk						47	54	59	56	39
<b>Hemnes</b>	42	45	48	29	39					
Andfiskå						26	31	35	23	33
Halsa i Helgeland	42	45	48	29	39					
Hestmannen	42	45	48	29	39					
Leland	42	45	48	29	39					
Mofjellet						26	31	35	23	33
Storfjell Vefsn	42	45	48	29	39					
Nesna	42	45	48	29	39					
Sandnessjøen	42	45	48	29	39					
Hattfjelldal 2	23	26	44	47	52					
Bergåsen(Trofors)	23	26	44	47	52					
<b>Salten</b>	50	43	60	30	33					
Beiarn 1	24	43	60	30	33					
Glomfjord	50	43	60	30	33					
Inndyr	50	43	60	30	33					
Mesøytoppen	50	43	60	30	33					
Rognan	50	43	60	30	33					
Røkland	50	43	60	30	33					
Rønvikfjell	50	43	60	30	33					

Seljeåsen							26	36	40	28	23
Sulitjelma 2	50	43	60	30	33						
<b>Steigen</b>	31	41	44	47	55						
Balstad	31	41	44	47	55						
Botnheia	31	41	44	47	55						
Fredvang	31	41	44	47	55						
Glåpen	31	41	44	47	55						
Hagskaret	31	41	44	47	55						
Kjøpsvik	31	41	44	47	55						
Reine							22	28	36	23	21
Røst	31	41	44	47	55						
Stamsund							22	28	36	23	59
Vinknes							25	28	35	39	53
Værøy	31	41	44	47	55						
<b>Hadsel</b>	45	48	58	25	38						
Bø i Vesterålen	45	48	58	25	38						
Kjelbergaksla	45	48	58	25	38						
Sildpollen	45	48	58	25	38						
Sortland	45	48	58	25	38						
Strønstad							28	32	54	35	23
Søberg	45	48	58	25	38						
<b>Andenes</b>	53	56	59	35	49						
Gryllefjord							34	41	51	30	27
Øksnes 1							29	50	54	30	51
<b>Narvik</b>	21	27	37	24	34						
Bogen	21	27	37	24	34						
Lødingen 2	21	27	37	24	34						
Ramsund	21	27	37	24	34						
Straumsnes							30	33	50	53	56
Tjeldsund 2	21	27	37	24	34						
Veggen							45	48	58	41	56
<b>Harstad 1</b>	26	46	51	23	36						
Evenesmark	26	46	51	23	36						
Foldvik							41	48	54	31	38
Gratangsbotn	26	46	51	23	36						
Ibestad	26	46	51	23	36						
Kveøy	26	46	51	23	36						
Lavangen 1	26	46	51	23	36						
Lavangen 3	26	46	51	23	36						
<b>Kistefjell</b>	26	46	43	23	36						
Nordkjosbotn	26	46	43	23	36						
Ramfjord 2	26	46	43	23	36						
Rubbestadfjell	48	50	54	58	60						
Salangen 2							38	41	48	30	54

Seljelvnes	26	46	43	23	36						
Setermoen	26	46	43	23	36						
Storhaugen	26	46	43	23	36						
Øverbygd	26	46	43	23	36						
Øvre Salangen	26	46	43	23	36						
<b>Trolltind</b>	27	39	42	34	22						
Burfjord 1	27	39	42	34	22						
Burfjord 2							31	37	49	25	44
Hansnes	27	39	42	34	22						
Hjellnesåsen							44	48	54	40	56
Kåfjord							48	51	54	30	59
Lyngen							21	31	37	24	50
Nordreisa	27	39	42	34	22						
Olderdalen							29	47	53	57	60
Skibotn							48	51	54	44	56
Skjervøy	27	39	42	34	22						
Spåkenes							55	57	60	45	52
<b>Tromsø 2</b>	47	50	55	37	40						
Blåmannen	47	50	55	37	40						
<b>Alta</b>	36	51	54	29	44						
Alta 2	31	45	52	38	49						
<b>Hammerfest</b>	33	37	48	41	26						
Hammerfjell							31	45	52	50	54
Hasvik	33	37	48	41	26						
Torskefjell							21	46	59	24	60
Kautokeino 2	46	56	59	33	43						
<b>Karasjok</b>	21	41	54	26	55						
<b>Nordkapp</b>	30	40	43	23	53						
Havøysund	30	40	43	23	53						
Kjøllefjord	30	40	43	23	53						
<b>Store Jekkir</b>	22	24	42	35	32						
Berlevåg	36	21	60	49	52						
Båtsfjord 2	36	21	60	49	52						
Mehamn	36	21	60	49	52						
Seida	36	21	60	49	52						
<b>Varanger</b>	28	33	50	35	41						
Karlebotn	22	58	44	46	53						
Sandneskrysset							22	30	44	46	53
Torsvarde	28	33	50	35	41						
Vardø	28	33	50	35	41						