



# **CDMA450 - a low frequency radio based broadband solution in Värmland**

## **1. Purpose of this document:**

The purpose of this document is to describe a best-practice case from all municipalities in Värmland regarding wireless broadband covering the entire Värmland.

## **2. Country and Region:**

Värmland, Sweden

## **3. Issue:**

Awareness-raising: Improving the knowledge about the possibilities of modern broadband technologies and the creation of incentives to use them with the aim to reduce restraints to use the technology; by that bringing new technology into use in the whole region.

The purpose of the project is to show municipalities that it is possible to cover an entire landscape region with extreme difficult nature, forests and mountains, in a rural area, with wireless broadband.

## **4. Approach / strategies / results:**

During the last two years, Region Värmland has actively been working to support the development of modern and advanced infrastructure to allow all citizens to have broadband access to internet available. Different technologies have been used, but the traditional xDSL technology has not been possible to implement to everyone in the county due to the rural nature of large parts of the County of Värmland and the high cost associated with expanding the xDSL network.

Region Värmland decided in November 2006 that *Nordisk Mobiltelefon* is to supply broadband internet access using the CDMA450 mobile network technology. The advanced CDMA450 network is based on the American 3G



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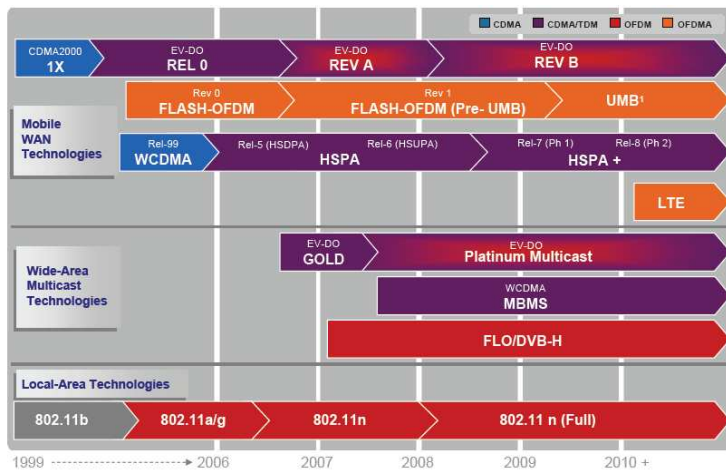
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technology CDMA2000 and combined with the low frequency, 450 MHz, provides a superior coverage in large rural areas.

The County of Värmland offer today broadband access to the internet everywhere and to all citizens in the whole County of Värmland (geographical area). This is unique in Sweden and probably in Europe since it is the first region ever to actually achieve the vision that all people shall have broadband access to the internet, allowing all people to take an active part in the new IT society.

## Technology

CDMA 2000 is the world's leading 3G standard, with 367 million subscribers compared with 115 million UMTS subscribers as of June 2007. It is a rapidly developing standard within the framework of 3GPP2 and is ahead of UMTS in terms of functionality. It is also particularly suited to operations in narrower spectrum allocations than UMTS since its basic bearer bandwidth is 1.25 MHz.



CDMA 2000 evolution compared to other technologies.

Nordisk Mobiltelefon has deployed CDMA 2000 in the 450 MHz band. The initial deployment was based on EV-DO Rev 0, but the network is already being upgraded to Rev A that gives up to 3.1 Mbps per sector downlink and up to 1.8 Mbps uplink. Rev B will further improve data rates in year 2009. The 450 MHz frequency band offers exceptional coverage properties both outdoor and indoor compared to any cellular band in commercial operation. This unique coverage is combined with the very advanced functionality from the very competitive markets in for example Japan and the U.S. The first mobile broadband service will also be followed by a variety of other services as soon as more spectrums is released when the old analogue system NMT 450 is closed down in Sweden on 31 December 2007.



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Consumers	<ul style="list-style-type: none"> <li>"Fixed" telephone with data and fax connector which does not require expensive copper line and monthly fee</li> </ul>	
	<ul style="list-style-type: none"> <li>Mobile broadband, Broadband where there is no ADSL, or as broadband fallback</li> </ul>	
Corporate	<ul style="list-style-type: none"> <li>3G telephony with coverage also outside the cities.</li> </ul>	
	<ul style="list-style-type: none"> <li>PMR and Dispatch radio with "unlimited" coverage, 3G, positioning, programmable emergency button, and broadband. Nextel type services.</li> </ul>	
Authorities	<ul style="list-style-type: none"> <li>Positioning and telemetry modules to track vehicles, transports, boats, boxcars, electricity meters, etc.</li> </ul>	
	<ul style="list-style-type: none"> <li>Priority subscriptions for public safety, police, ambulance, etc.</li> </ul>	

## Different services will be offered on the network.

The network will not only solve the problem of broadband to everyone by the initial mobile broadband service. Based on the same network investment, it is also possible to get public safety voice and data communication, 3G with rural coverage, and of course telephony in remote areas. These applications often require subsidies or similar if dedicated networks are built for each application.

CDMA450 therefore stands out as a remarkable, cost efficient and reliable solution for advanced communication in both rural and urban areas.



- Basic PTT Pro-handset

Advanced 3G+ Pro-handset

## Roll-Out and Coverage

### Roll-Out

The roll-out in Värmland started in December 2006 and after six months the whole geographical area was covered.

In using existing infrastructure and without building a single new site the deployment has been very fast and the whole geographical County of Värmland today has broadband access available. This is the first time that this is achieved in Sweden.



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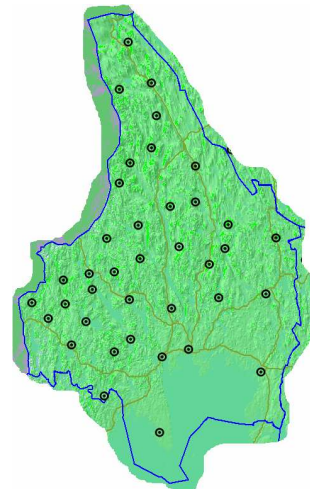
One of the key challenges in building cost-effective and reliable network is the construction of access and backbone transmission for connecting the base stations. We have done this on a rental basis using mainly *Teracom's* access and backbone network which provides a stable and secure connection back to the switch site located in Stockholm.

It is important to point out that the bandwidth in the CDMA 450 network is dependent on the distance to the base station, but it is the only solution that delivers bandwidth of more than 0,5Mbps in combination with coverage throughout the whole region.

## Coverage

*Nordisk Mobiltelefon* has chosen to offer all municipalities in Värmland coverage, which is more cost-effective than covering single municipalities. A great advantage of the CDMA 450 frequency is the possibility to provide a good service where people live and work. In many cases it is very difficult to justify fixed line cables from the telephone exchange to the customer both economical and technical since the distance might give the DSL service poor performance. In these cases, the CDMA 450 is a superior solution which offers coverage everywhere and also allows people to bring their data modems both to summer houses, on their travels and in Norway and still have good broadband access.

CDMA 450 coverage in Värmland



*Nordisk Mobiltelefon* also has a Norwegian network and offers the customer access to the CDMA 450 service in Norway.

## 5. Main impacts:

The municipalities in Värmland have, in recent years, actively worked at taking advantage of the opportunities afforded by broadband technology, and by starting the joint project "IT Värmland" the goal of which is to contribute towards economic growth, the development of businesses and an increase in jobs. Joint broadband expansion has been ongoing among Värmland's 16 municipalities and an absolute basic condition is that each business has access to a broadband Internet connection. For a number of



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years ago the discussion centred on providing broadband, today the discussion focuses on business not being able to survive without broadband.

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The roll-out of the low frequency radio based broadband solution *CDMA 450* in Värmland started in December 2006 and after six months the whole geographical area was covered.

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## 6. Conclusions and Recommendations:

CDMA 450 is a superior solution which offers coverage everywhere and which also allows people to bring their data modems to both summer houses and travelling and they will still have a good broadband access.

## 7. Attachments:

PowerPoint presentation: Broadband in Värmland

Strategy Study: E-services in Värmland, chapter 3 (in English)

Confirmation of publishing allowness

Location and Date

Name, Stamp and Signature

