

Helsinki University of Technology

Telecommunications and Multimedia Laboratory

Technology Strategy Analysis for Emerging Communications Technology

Case: Ultra Wideband Communications

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In this presentation:

- ▶ Background & Goals for Research
- ▶ *Part 1: Technology Strategy Framework*
- ▶ *Part 2: UWB Technology*
- ▶ *Part 3: Synthesis and Results*

Study Background

- ▶ Study is done as a part of BROCOM (Tekes) research project at HUT / TML Laboratory
- ▶ Supervisor:
Prof. Riitta Smeds
- ▶ Instructor:
Teaching researcher Sakari Luukkainen

Main Goal for the Thesis

- ▶ Give thought-out recommendations for Finnish ICT companies, especially mobile equipment manufacturers, on *strategic actions related to UWB technology*

Research Tools

- ▶ Applying an emerging technology into ICT business is a question of **product strategy**
- ▶ Michael E. McGrath:
”Product Strategy for High-Technology Companies”
- ▶ UWB technology study: fellow researchers at HUT, Internet sources (Intel, FCC et al.)

Part 1

Technology Strategy Framework

UWB has a broad application range and wide time span
– a comprehensive set of analysing tools is needed

▶ The most important aspects to keep in mind:

- Competitive Strategy
- Corporate Leverage in new products & markets
- Varying roles of technology
- Risks in new product development

Risks in New Product Development

▶ Technology Risk

- for example rival technologies

▶ Market Risk

- for example uncertainty of actual demand for new technology

Varying roles of technology

- ▶ Core Product technology
- ▶ Essential Supporting Technology
- ▶ Technology for Additional Features
- ▶ Strategic decisions depend heavily on new technology's role in a company's portfolio

Competitive Product Strategy

▶ Competitive Strategy Fundamentals:

- Price-based
- Product differentiation

▶ Michael E. McGrath:

”Product differentiation strategy provides the primary source of competitive advantage for most high-technology products”

Strategic Timing

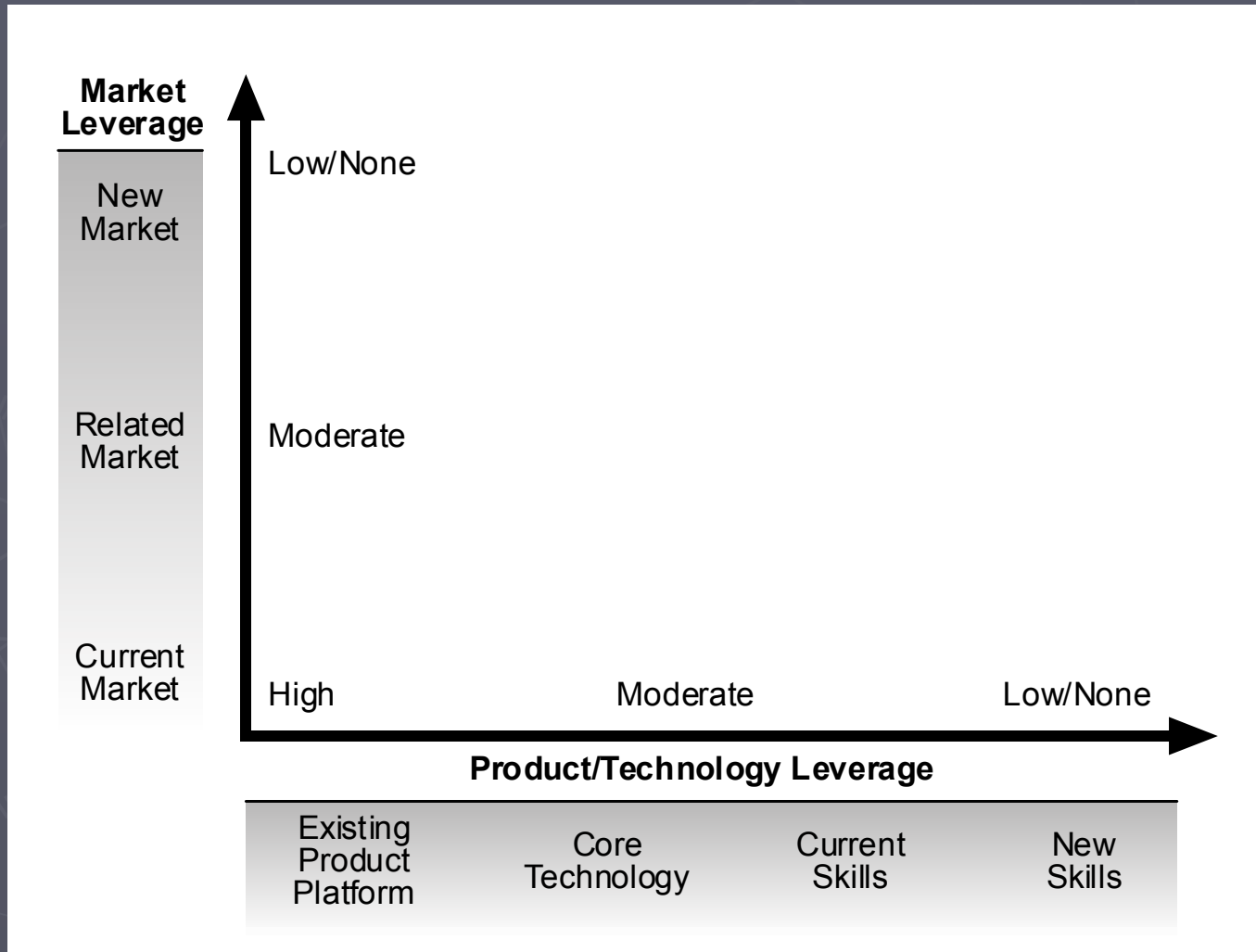
▶ **First-to-Market**

- ▶ for example market share advantage, early experience

▶ **Fast Follower**

- ▶ for example ability to wait until market is clarified, and avoid market education costs

Leverage from market competencies and technical competencies



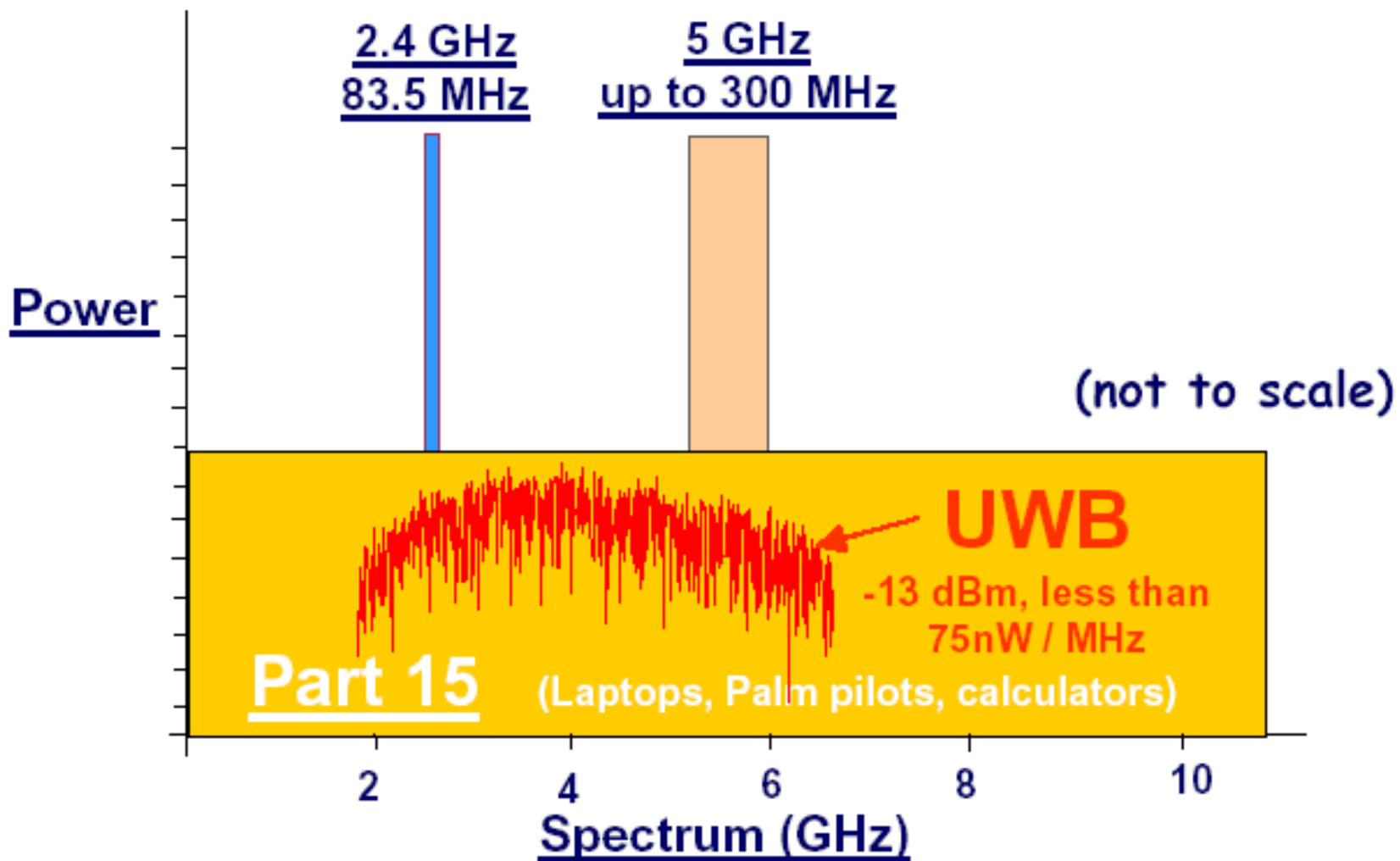
Corporate Leverage in New Products & Markets

- ▶ Case studies show that *success of expansions to new product markets depends highly on company's ability to leverage existing market knowledge and technical skills*

Part 2

UWB Communications Technology

- ▶ *Ultra Wideband Communications:*
Radio transmission without RF carrier signal
on a several GHz wide band
- ▶ a.k.a. Impulse Radio

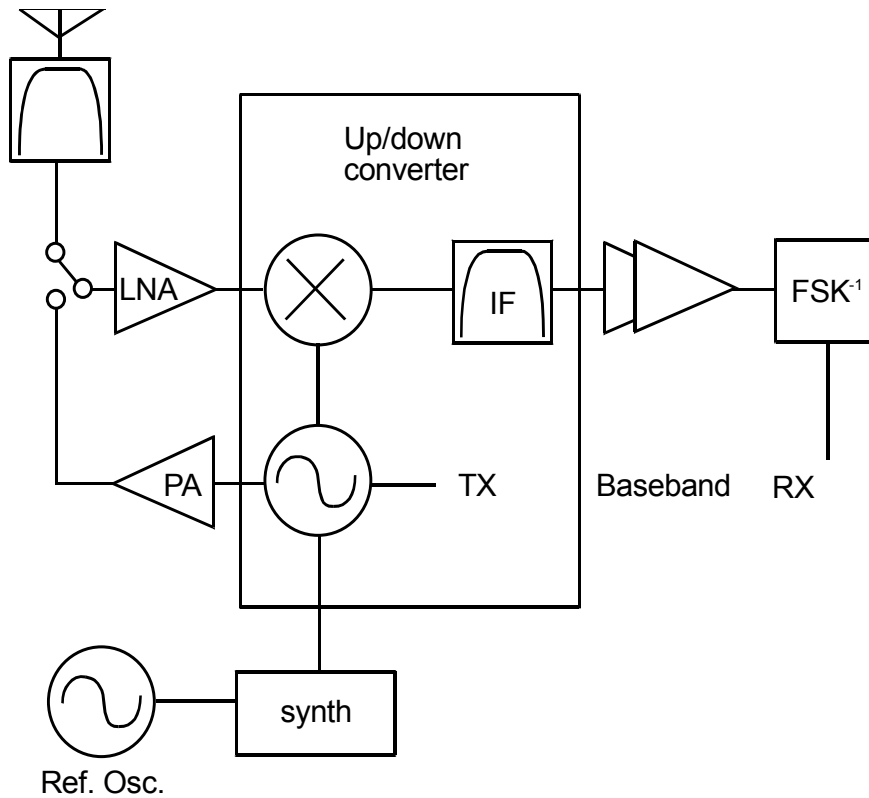


The above graph is courtesy of Time Domain, Inc.

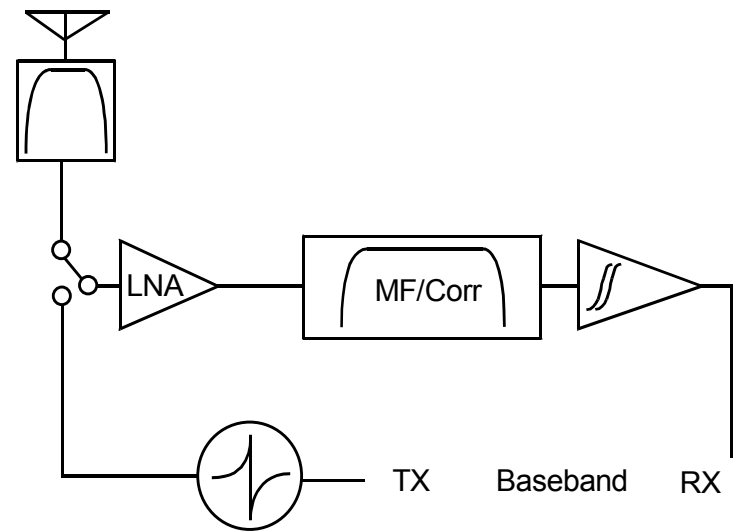
UWB Pros

- ▶ High Connection Speeds
 - Enabler of New Services and Functions
- ▶ Low power consumption:
 - Essential in Handheld Devices
- ▶ Reuse of radio spectrum
- ▶ Less components needed → Low Cost

Example Bluetooth Transceiver



Example UWB Transceiver



UWB Cons

- ▶ The most acute problem:
Lack of common UWB standards
- ▶ Propagation of UWB signals is difficult to control due to the width of the frequency band
- ▶ Interference risks (more political than actual)
- ▶ Regulation issues

What, when?

- ▶ Personal Area Networking (PAN) is the primary application field of UWB
 - 3-15 m range, 100-500 Mb/s
- ▶ Ad Hoc Networking: teamwork, messaging, gaming...
- ▶ Early products in 2003...2005
To mass market in 2006...2010?

UWB Hot Spots, WLAN

- ▶ Due to restrictions related to regulations, possibility of interference, and channel acquisition problems *UWB is not initially a hot spot technology*
- ▶ Further research needed, because:
 - Support for both **PAN & Hot Spot** functions would generate a great positive feedback to the popularity of UWB

Conclusions on UWB

- ▶ *Wireless Interconnection of devices related to datacom and entertainment*
- ▶ A complementing technology in Nokia's visions of future mobile devices: wireless connectivity of versatile hardware

Part 3 – Synthesis & Results

UWB, a risky business?

→ Technical and economic advantages are so strong that risks are tolerable, at least for companies that use UWB as a complementary technology

▶ Technology risks

- for example interference, politics, rivals: 17 GHz Multi-OFDM, 60 GHz UWB

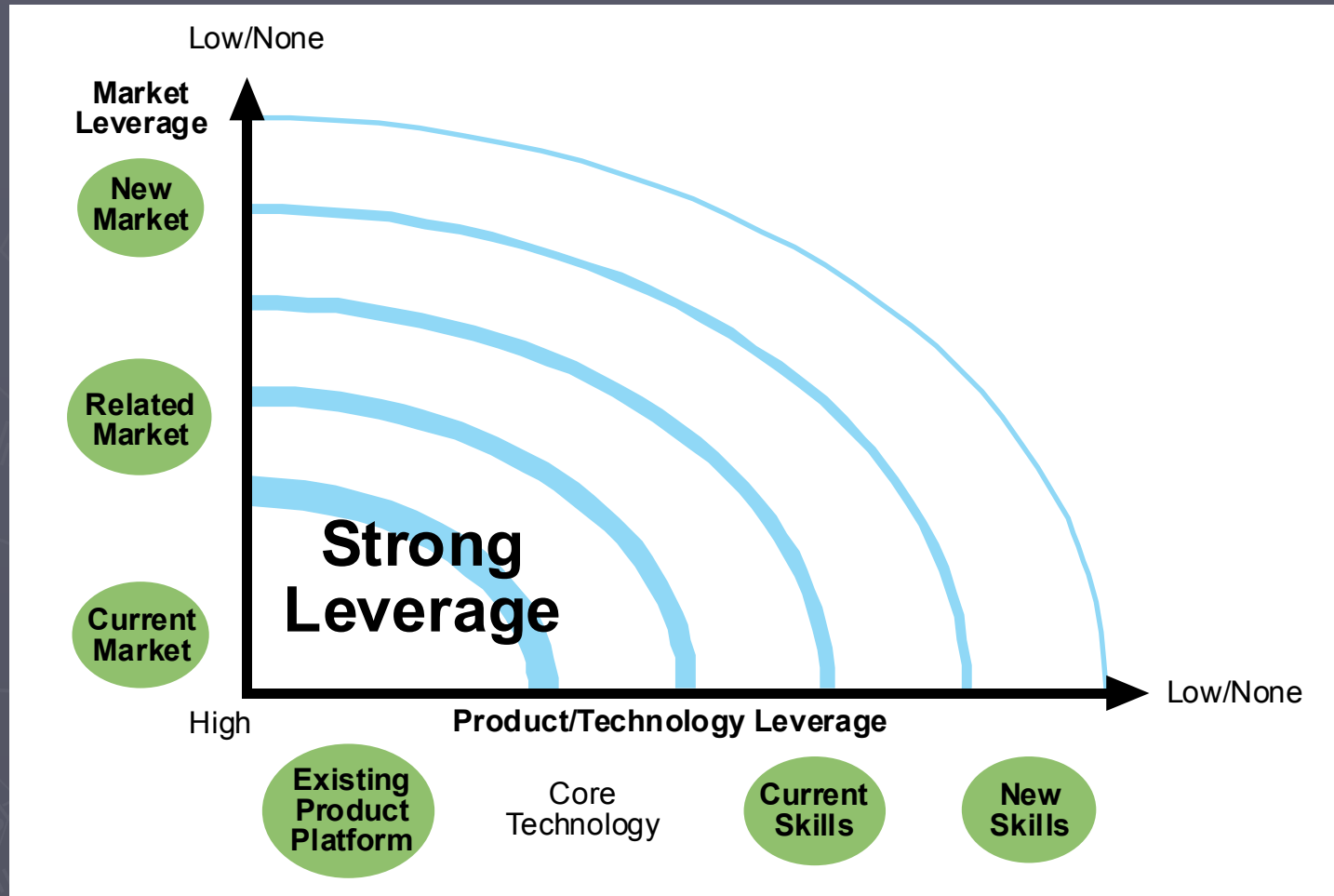
▶ Market risks

- What if WLAN and Bluetooth are enough?

→ Lots of risks and problems involved, but the push of a revolutionary technology is strong

UWB Technology

– Prospects for Mobile Equipment Manufacturers



Strong leverage on both: markets and technology

- ▶ The role of UWB: *a value-adding feature* for mobile phones
- ▶ Helps *redifferentiating* a relatively mature market of mobile phones
- ▶ *Differentiation by versatility*

New UWB-enabled functions

for mobile phones, for example:

▶ Mobile Storage

- Raw Data Storage (documents, applications, media files)
- Music
- Digital Photographs, Video clips

▶ Transferring Pictures and Video

▶ Wireless Wideband Modem Everywhere

▶ Connections between the phone, external displays, image capturing systems, speakers, game controllers

▶ UWB Walkie-Talkie

Strategic Timing Options

► First-to-Market Strategy

- ...**if** you have a clear product strategy and the required technical pieces together
- ...**if** standardization (official or de-facto) of UWB is in its final straight
- ...**if** you can build a strong *UWB Strategic Partnership*

► Fast Follower

- ...**if** you have a fast and ready product development abilities
- ...**if** UWB shows more uncertainty and thus higher risk
- ...**if** someone else makes it first – be prepared

UWB TODO LIST

for equipment manufacturers

- ▶ Participation in UWB technology standardizing
- ▶ R&D brush-up: readiness for UWB technology
- ▶ UWB partnership planning
 - Making UWB the *"wireless lingua franca"* can't be done alone

Summary

- ▶ UWB holds great promise, but is at this point immaturity and uncertainty are evident
- ▶ Being informed about the technology and standardization processes is crucial
- ▶ UWB could be *much ado about nothing*, but...
 - A researcher's guess: UWB is here in 2004! 