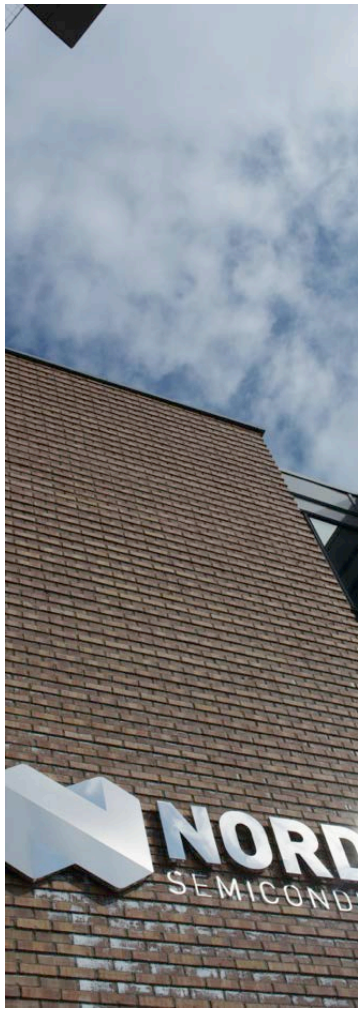
GLOBAL tech TOUR

nRF 5 SERIES

ULP wireless landscape

From specialist niche to mainstream

NORDIC SEMICONDUCTOR



Nordic Semiconductor

- Sole focus on ultra low power wireless
- *Bluetooth*® low energy, ANT and proprietary 2.4GHz
- Founded in 1983
- 180 employees
- Global company
  - Headquarter Trondheim, Norway
  - Norway, US, Hong Kong, Taiwan, Philippines, Korea and Japan
- Listed on the Norwegian Stock Exchange (NOD)

Exciting opportunities

Mobile, Connected TV and Healthcare is the new wave

PC Peripherals

Sport &Fitness

Toys

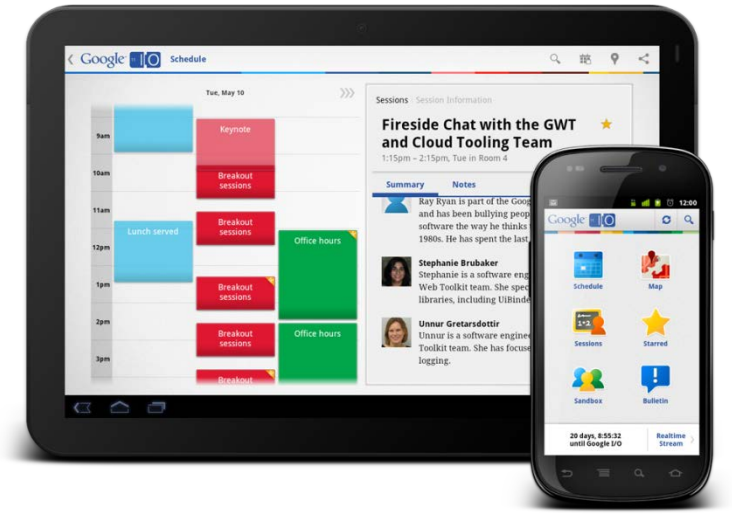
Mobile

PC & entertainment

Healthcare

Mobile is the next frontier

'Appcessories' is the future mobile phone and tablet peripherals



- 'Appcessories' is an accessory paired with an app
- Adoption of *Bluetooth*® low energy and ANT in smartphones and tablets
- The new "hub" for ultra-low power 'Appcessories'
  - Sports and fitness sensors
  - Watches and armbands
  - Security and tracking
  - 'Home' sensors
  - Industrial monitoring
  - logistics
  - Retail / POS

HID is expanding

- Entertainment on demand changes the requirements to the user interface
- Home entertainment UI adopts PC space requirements
- Adoption of Bluetooth / Wi-Fi combos in Connected TVs and multimedia solutions
- *Bluetooth*® low energy is an ideal solution for the next generation smart remotes

Healthcare

End to end solutions

- Remote healthcare services require connectivity up and down to the cloud
- Cellphone a key component to mobile healthcare
- Continua Alliance adopted BLE
- BLE allows seamless open standard connectivity
  - Sensor
  - Cellphone
  - Cloud
  - Backend monitoring & service provision

ULP wireless

Open ecosystem standards

- Yesterday
  - No suitable ULP standard – proprietary solutions necessary
  - Closed systems
  - Dongles to connect to back-end services
  - Single vendor eco systems
  - Small to medium volumes
- Today – Tomorrow
  - Smart phones and tablets take over as user interfaces
  - Open standards enter the ULP world
  - Appcessories –ULP wireless ecosystems
  - Data directly to the cloud
  - Multivendor eco systems
  - Large increase in potential volume

What's the nRF51 Series?

- **Series of ICs and Software Stacks**
  - Made for todays ULP market
- SoCs for *Bluetooth*® low energy, 2.4GHz RF and ANT™
- **Common IC architecture**
  - Multi-protocol 2.4GHz radio
  - ARM® Cortex™-M0 processor
- **Common software architecture**
  - *Bluetooth*® low energy and ANT™
  - Easy, fast and safe application code-development
- **Code and pin compatibility**

The puzzle is solved with nRF51

One for all

nRF 2.4GHz RF

- 250 kbps GFSK
- 1 Mbps GFSK
- 2 Mbps GFSK

- Stacks available today:
  - nRF51422:
    - 8 channel ANT
  - nRF51822:
    - Bluetooth Low energy peripheral role
    - 2.4 GHz (Gazell)
    - Non-concurrent *Bluetooth*® low energy and proprietary 2.4GHz
- *Coming on nRF51822*
  - *Bluetooth*® low energy central role Q1-13
- Coming
  - Concurrent ANT/BLE peripheral Q1-13

Complete application coverage…

- Multi-vendor Bluetooth 4.0 device interoperability
- HID, Medical, Sport, 'Appcessories'
- Strong Security and privacy, scalable

- Large install base and interoperable ANT+ profiles
- Sport, Medical
- ULP Sensor and advanced network topology

- Total flexibility when you develop end-to-end applications
- Highly successful in PC Peripherals, Toys, Remote today
- You control interoperability and qualification

nRF51 Series IC line-up

IC family	Description	*Bluetooth*® low energy	2.4GHz RF	ANT™	SoC Application Flash / RAM	Protocol stacks
nRF514xx	ANT™ RF ICs		■	■	16 to 224kB Flash >= 8kB RAM	Pre-programmed Stack + SDK
nRF515xx	2.4GHz RF ICs		■		<= 64kB Flash <= 6kB RAM	SDK
nRF518xx	Multi-protocol *Bluetooth*® low energy / 2.4GHz RF ICs	■	■		>= 128kB Flash >= 8kB RAM	Downloadable Stack + SDK

Maximum re-use and easy migration

Accelerated time to market and reduced risk

Code compatibility	▪ *Bluetooth*® low energy, ANT™ and 2.4GHz RF ▪ Develop and maintain a single code base ▪ Learn nRF51 one time
Pin compatibility	▪ *Bluetooth*® low energy, ANT™ and 2.4GHz RF ICs ▪ Memory size/type and features ▪ Reuse PCB layout ▪ Use superset IC for development and switch to “best fit” for production
Code migration & Ecosystem	▪ Smooth code migration from other Cortex-M based processors ▪ Leverage strong ecosystem of ARM development tools and software

ULP wireless landscape

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