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October 3, 2008

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street SW
Washington, D.C. 20554

Re: **NOTICE OF EX PARTE PRESENTATION**
ET Docket Nos. 06-135, 05-213, 03-92

Dear Ms. Dortch:

Pursuant to Section 1.1206 of the Commission's rules,[1] the purpose of this letter is to notify the Commission that following representatives of ON Semiconductor Corporation ("ON Semi"), met yesterday with Renée Roland Crittendon, Legal Advisor for Spectrum & International Issues for Commissioner Jonathan S. Adelstein:

Bryan N. Tramont, Wilkinson Barker Knauer, LLP
Robert G. Kirk, Wilkinson Barker Knauer, LLP
Robert Tong, Vice President, Head of Medical Division, ON Semi
Marc Niklaus, Product Line Manager Audiology Solutions, ON Semi

The parties discussed the attached slides and prior filings by ON Semi in this proceeding regarding the possible authorization of wireless hearing aids in the upper portion of the proposed MedRadio ("MEDS") band (405-406 MHz).[2]

If you have any questions concerning this notice, please contact the undersigned.

Respectfully submitted,

/s/Bryan N. Tramont
Bryan N. Tramont
Robert G. Kirk

cc: Renée Roland Crittendon (via e-mail)

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[1] *See* 47 C.F.R. §§ 1.1206(a), (b).

[2] *See* Letter from Robert G. Kirk, Counsel for ON Semiconductor Corporation to Marlene H. Dortch, Secretary, FCC, ET Docket No. 06-135 (Sept. 18, 2008); Letter from Robert G. Kirk, Counsel for ON Semiconductor Corporation to Marlene H. Dortch, Secretary, FCC, ET Docket No. 06-135 (May 1, 2008); Letter from Bryan N. Tramont and Robert G. Kirk, Counsel for AMIS, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 06-135 (Feb. 7, 2008).

ON Semiconductor®

Ultra low power wireless hearing aids for operation in the proposed MedRadio (MEDS) band

October 2, 2008

ON Semiconductor - Quick Facts

- **Founded**: ON Semiconductor spun off from Motorola in 1998
  Motorola Semiconductor was founded in 1960; AMI Semiconductor was founded in 1966
- **Operations**: Worldwide Headquarters: Phoenix, Arizona
  Design Centers and Manufacturing: Worldwide Locations
- **Revenues**: $2.2 billion (pro forma 2007)
- **Employees**: ~14,000 worldwide
- **NASDAQ**: ONNN
- **Business**: Design and manufacture of mixed signal and digital semiconductor products. Preferred supplier for efficient power solutions in the fields of:
  - Automotive
  - Computing
  - Communications
  - Consumer Electronics
  - Industrial
  - Medical
  - Military and Aerospace
- **Medical applications include**:
  - Implantable Medical Devices (IMD) such as defibrillators, pacemakers, neurostimulators
  - Hearing Audio Solutions (HAS) such as hearing aids, electronic stethoscopes
  - Diagnostic Therapy and Monitoring (DTM) such as glucose, pulse-oxy meters

Summary

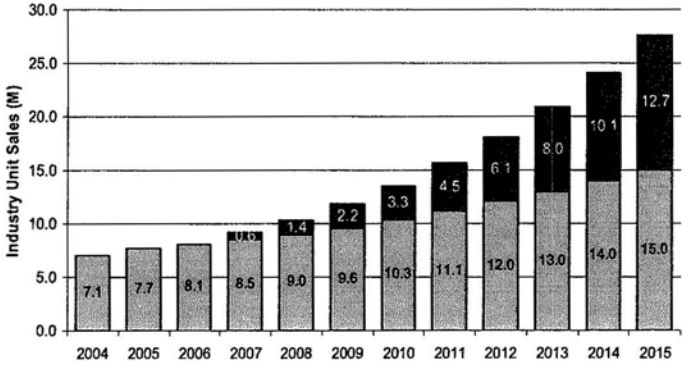
- The MICS/MEDS bands are optimal for body worn communications
- MEDS bands provide perfect opportunity to permit deployment of next-generation hearing aids that improve hearing capabilities by utilizing wireless technology:
  - Bi-directional ear-to-ear synchronization and communication
  - Remote sound pick up and relay to the hearing aid
  - Secondary audio device to the hearing aid
- MEDS bands would be harmonized with proposed international standards and therefore provide worldwide access and deployment capability for these hearing aids
- Deployment of next-generation wireless hearing aids in the MEDS bands would not interfere with MICS-based devices, nor preclude operations of MEDS-based devices
- ON Semiconductor proposed rules would permit deployment of these hearing aids in only one (the upper) of the two proposed MEDS bands, leaving 85% of the MEDS spectrum exclusively available for non-hearing aid devices!

Hearing Aid Basics: Quick Facts

- Hearing loss population: **~1-in-10** (31.5 million in US)
- Low hearing aid adoption rate: **~1-in-5 (20%)** in US & Western Europe
  ~5-6% in the rest of the world
- Reasons for low adoption: Stigma, cosmetics, denial, high cost, constrained channels, hearing aid efficiency
- Binaural rate (two aids): **75-80% US**
  60% Western Europe; 10-12% rest of World
- Avg. age of first time user: **69**
- Avg. replacement frequency: **5 years**
- Retail price: **$1,500 - $3,000**
- Global sales (retail): **~$10 billion**

Baseline growth is running at 6-8% annually

Improved style and technology for Hearing Aids is expected to generate additional growth, up to 14%



Source: Better Hearing Institute Study (Sep 2006); Kaupthing (October 2007)

Key Trends

Ever smaller, more features, even fashionable!

- Newer aids lower the average age of new users by ~9 years
  - Increases new user rate by 29%
  - Helps more hearing impaired people

ITE Styles
Customized to shape of ear

BTE
Customized
ear mold

Mini BTE
Customized
ear mold

Mini BTE "Thin tube"
Non-occluding "open fit" ear molds
Standard ear mold sizes
Some designs place the receiver in the ear

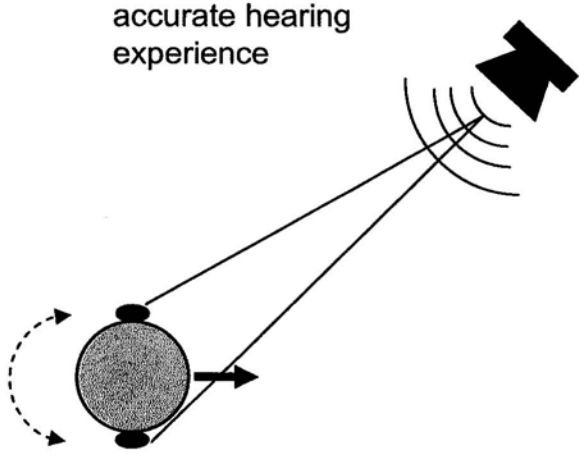
- **Popularity of smaller styles drive need for smaller electronics and smaller battery**
- **Desire for long battery life (at least one week) demands ultra-low power electronics**
- **And HAs must include new features all the time: <u>such as wireless connectivity</u>**

Source: Better Hearing Institute (BHI) Study, 2006

Where wireless enabled hearing aids can help today

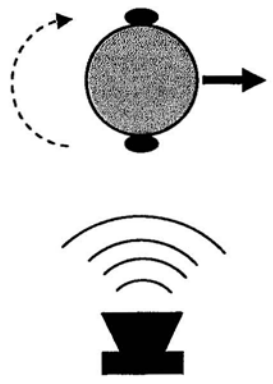
Wireless ear to ear synchronization for a better 3D listening experience

- The brain localizes sound by analyzing incoming delay and intensity differences between the left and right ear
- Two un-synchronized aids will individually amplify/correct the sound, resulting in lost directional information
- Wirelessly synchronized aids can exchange data to restore an accurate hearing experience



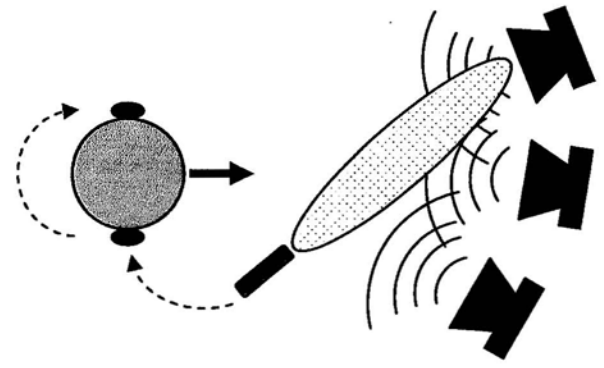
Wireless "sound relay" for more safety

- When sound emanates from one direction only, in the case where that side's ear is fully impaired, capturing the sound with the remaining ear can be challenging.
- Capturing and relaying the sound from one side to the other adds safety and listening comfort, by restoring a 360° aural field!



Wireless "audio zoom" for increased listening comfort

- Hearing impaired people are challenged the most in noisy situations
- Hand-held or body worn "zooming microphones" can help select sounds of interest.
- Wirelessly relaying it to the aids adds freedom of movement



Wireless Link
Sound Waves
Sound pick up zone

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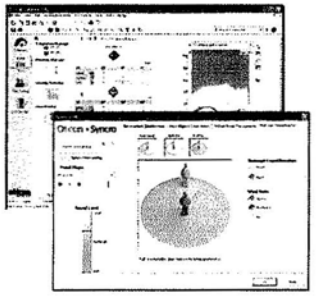
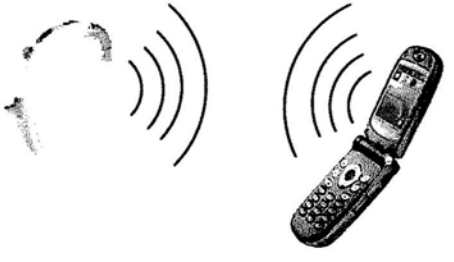
Wireless hearing aid devices of tomorrow

- **Future generations of wireless technology for hearing aids**
  - **Wireless connectivity with secondary audio devices (cell phones)**
    - Helps solve GSM interference issues with hearing aids (HAC)
    - Provides effective audio quality from GSM devices for the hearing impaired
  - **Wireless fitting**
    - To allow for an unimpeded listening experience for fitting
    - Wireless fitting allows for a better user experience for the use of the aid
    - Audiologist/Specialist can make changes to aid parameters in real-time

Wireless fitting (programming)



Connectivity with secondary audio devices (cell phone)



Why MEDS-Based Hearing Aids Make Sense

- **Wireless link**
  - Studies show that the 400MHz frequency range is the "sweet spot" for in and around the body communications, with minimal loss due to body tissue absorption hence best "energy efficiency" from the radio.
- **Mechanical form-factor**
  - The mechanical size will only allow for a very integrated radio (few external components)
  - The antenna must be "protected" and inside the hearing aid housing, hence will be small
- **Power consumption**
  - The radio is constrained by the power provided by ONE small coin-cell battery, thus precluding deployment of sophisticated radios (i.e. Bluetooth).
- **World-wide Compatibility**
  - Hearing aid users travel across the globe. They need their wireless enabled hearing aids to operate everywhere.

Status in Europe

- To date 13 European countries have authorized deployment of wireless hearing aids in one MICs channel at 404.2 MHz:
  - Germany, Great Britain, France, The Netherlands, Sweden, Finland, Ireland, Iceland, Portugal, Poland, The Czech Republic, Romania and Greece.
  - Medtronic incorrectly claims that devices only authorized in Germany

- ETSI is considering a new standard that would permit wireless hearing aids to operate in the upper MEDS band (405 - 406MHz) through its Task Group 17 (wireless audio)
  - Task Group 17 is evaluating an new standard that would permit wireless hearing aid deployment in the 405-406 MHz band.
  - A full technical report, including a study on sharing and co-existence will be delivered at the next ERM meeting (November 2008)
  - A separate Task Group – Task Group 30 – previously objected to the deployment of wireless hearing aids in the 405-406 MHz band. Despite this objection, Task Group 17 continues to move forward with work on a new standard that would permit wireless hearing aids in this band.

Proposed MEDS Rules

- New § 95.401(h). The Medical Device Radio Communication Service ("MedRadio" or "MEDS") – a service that may be used for ultra-low power transmissions from implanted and body-worn devices that restore bodily functions (*i.e.*, sight, hearing, muscle movement) and/or perform critical diagnostic, therapeutic, or monitoring functions. The rules for this service are contained in subpart M of this part.

- Add new § 95.631(l). MEDS transmitters may transmit any emission type appropriate for communications in this service. Given potential hearing aid applications, MEDS transmitters may be used to provide voice communications.

- The MEDS wing bands are perfectly suited for wireless Hearing Aid operations but:
  - The MEDS maximum allowed duty cycle and EIRP should be the same as for MICS: -16dBm, 100% DC when listen-before-talk (LBT) spectrum access is observed
  - One 300kHz segment is necessary for optimal hearing aid operation, thus aggregation of the 100kHz channels should be permitted
  - Only a portion of one of the two MEDS wing bands is necessary for hearing aid applications – only 3 of the 10 100kHz channels in the upper band

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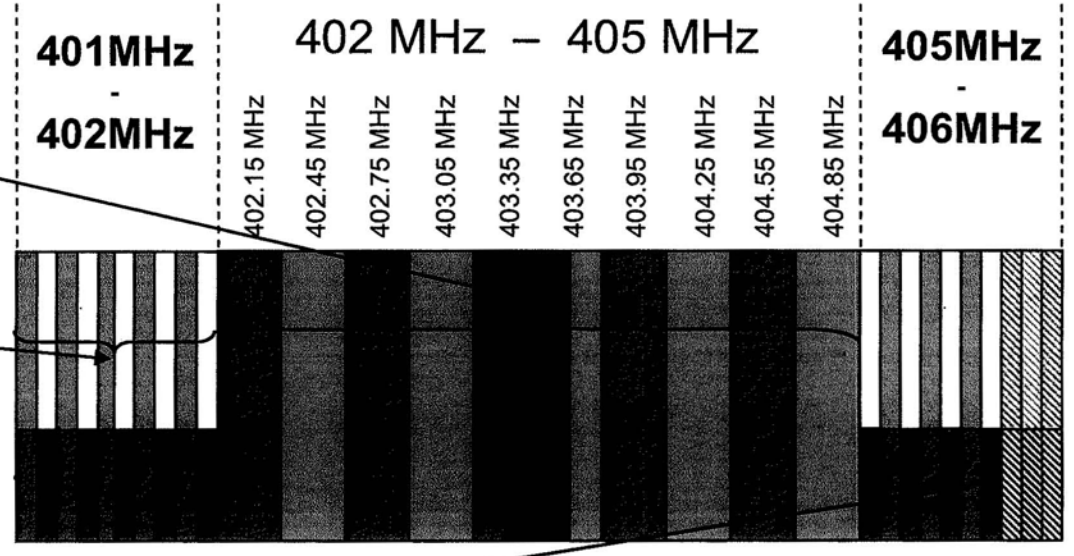
Proposed MICS/MEDS band plan

To accommodate worldwide hearing aid deployment



MICS
(left unchanged)

MEDS lower wing band
(left unchanged)

MEDS upper wing band
(only 3 channels change)
Permit aggregation of 3 100kHz channels
(for a total of 300kHz)
-16dBm, LBT, 100% DC

Safely sharing the MEDS band…

- Wireless hearing aids will only operate in <u>one</u> 300kHz channel[1] located in one of the two proposed MEDS bands[2]
  - Hearing aids would co-exist with other MEDS devices in 15% of the proposed new spectrum (3 channels); 85% of MEDS (17 channels) remain exclusively available to all other non-hearing aid MEDS devices
- Within their channel, wireless hearing aids will use a Listen-Before-Talk (LBT) spectrum access protocol to minimize risk of interferences
  - This is conform with the current access protocol in the MEDS proposal
  - As such, wireless hearing aids will behave no differently from other MEDS devices
- Wireless hearing aids operate with extremely low power. Achieved range is engineered with minimal radio energy
  - In a binaural (ear to ear) configuration two users of wireless hearing aids[3] can sit next to each other without their aids interfering with one another
  - As such the same radio spectrum becomes re-usable every ~40cm
  - As such only one channel is required for hearing aids, they can co-exist!
- Hearing aid will still operate when wireless functionality is unavailable due to LBT or interference.

[1] made of 3 consecutive, aggregated 100kHz channels [2] the upper band: 405 – 406MHz [3] using the one and only proposed band set to the same frequency

For additional information

Robert Tong
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