**IEEE 802.15**

**Wireless Specialty Networks (WSN)**

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| Project | IEEE P802.15 Working Group for Wireless Specialty Networks (WSN) |
| Title | **Minutes for IG SWC meeting on September 2025** |
| Date Submitted | [08 Oct. 2025] |
| Source | [Jung-hwan Hwang(Daniel)][ETRI] | Email: [jhhwang@etri.re.kr]Voice: [+82 42 860-1176] |
| Re: | [] |
| Abstract | [IEEE 802.15 IG SWC meeting minutes] |
| Purpose | [Official minutes of the IG SWC meeting on September 2025] |
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**158th IEEE 802.15 WSN SESSION**

**Hilton Waikoloa Village, HI, USA (all times in local) September 14-19, 2025**

# 802.15 IG SWG Meeting

# Monday, 15th September 2025

**1. Meeting Called to Order**

* IG Chair call the meeting to order at 04:04 pm local time.

**1.1. IEEE Patent Policy – Call for LOAs**

* IG Chair asks whether there are any potentially essential patients that you would like to declare. Seeing none.

**1.2. IEEE Copyright Policy**

* IG Chair reminds the floor of the article on the copyright policy.

**1.3. IEEE Participant Behavior**

* IG Chair reminds the floor of the participant behavior. IG Chair also notes that paying the registration is required to attend this meeting.
* IG Chair passes an attendance list so that all the participants can write down names. IG Chair also makes a screenshot of the Webex window.
* IG Chair asks the floor to mention name and affiliation when they speak. Participation in this meeting is by individuals. If we must vote here within the group, voting rights are required even at IG, so everybody can vote here in the group.

**1.4. Review of meeting objectives and agenda approval**

* IG Chair reviews the meeting agenda in doc. #15-25-0432-01. IG Chair notes that there are four technical contributions for this meeting. IG Chair asks for any objections about the agenda from the floor. Seeing none, so the meeting agenda has been approved.
* IG Chair mentions the next steps. One of important objectives for this IG SWC is to find some gaps between the current specifications and required ones for SWC. If we find out the gaps, then we can decide how we continue.
* IG Chair asks the floor if there is any addition to the current agenda. No additional agenda is requested from the floor and the online audience.

**2. Technical contributions**

* IG Chair reminds all the contributors of how to prepare for their contribution. IG Chair notes that all the contributions should use the IEEE 802.15 template.

**2.1 Surface-Wave Communication: Rethinking the Future of Wireless**

* Kai-Kit from University College London starts to make presentation focusing on the use cases of SWC. The document number is 15-25-0440-01.
* The presenter introduces the MIMO technology as mentioning that the channel capacity is not fully used due to the channel complexity. The presenter claims that SWC is an innovative approach in that SWC reduces the complexity because it uses any surfaces instead of space.
* The presenter presents an SWC prototype to show feasibility of SWC. The prototype includes reconfigurable waveguides for the surface wave in the frequency bands from 21 to 42GHz. All the reconfigurable waveguides are manufactured using 3D-printing technology.
* IG Chair asks a question from the floor.

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| **Questions or Comments** | **Answer** |
| A trade-off between complexity and performance | * Many industries are asking for hardware reduction for their communication system even though they are expecting performance reduction.
* SWC is very promising due to complexity reduction
 |
| Many assumptions in the presentation | * Industries are motivated by new technologies when they find out potential of the technologies in resolving limitations of mobile communications.
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| Frequency selection | * High frequencies are better to reduce size of hardware.
* Also, it is easy to manufacture it using a 3D printer.
 |
| Dielectric materials should be backed by a metallic ground plane | * SWC is advantageous in that it does not make the communication further complicated as providing freedom to use propagation medium without any cost.
* The surface wave itself propagates with less attenuation compared to space waves
 |
| Frequency range in SWC | * This issue should be discussed in the research team.
* Some industrial people are already expressing interest in the millimeter SWC.
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| PHY layer requirements of SWC | * No new PHY is required.
* Once after space waves are transformed into surface ones, it propagates along the material surface.
 |

**2.2 Metal Surface Magnetic Communication (MSMC) for IEEE Standardization**

* Haksun from Sunny Wave Tech. in South Korea makes presentation focusing on introduction of Metallic Surface Magnetic Communication (MSMC). The document number is 15-25-0443-01.
* The presenter notes that MSMC is a solution to resolve electromagnetic wave shadowing inside metallic structure, such as ships, pipelines, and industrial chambers.
* The presenter claims that the feasibility of MSMC has been shown from test in various environments including Aluminum and steel ships, large-sized ships, underground metallic pipes, chambers for semiconductor manufacturing, and construction sites.
* The test results show that MSMC achieves high-rate data transmission up to 150Mbps through four decks inside a large-sized ship.
* The presenter finishes the presentation hoping that the activities in IEEE 802.15 could achieve standardization and globalization of the MSMC technology.

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| **Questions or Comments** | **Answer** |
| Modifications in PHY are required to realize MSMC | * No major modifications are required.
* Exception is that an antenna structure, called a resonator in MSMC, should be modified to transform a space wave into a surface one.
 |
| Properties of the channel used by MSMC | * Fading properties are different from those in the wireless channel.
* MSMC has excessively long fading, but the fading becomes short in some cases.
* New channel model is required considering a larger number of compartments, for example, between control and engine rooms.
 |
| Information about the channel model of MSMC is beneficial when IG starts to prepare for an IG report near future | - |

**3. Recess**

* IG Chair postpones the 3rd presentation to the Wednesday session because the remaining time is not enough to listen to the presentation.
* IG Chair recesses the meeting at 05:40 pm local time.

# 802.15 IG SWG Meeting

# Wednesday, 17th September 2025

**1. Meeting Called to Order**

* Meeting is called to order by IG Chair at 04:05 pm local time.
* IG Chair asks whether there are any potentially essential patents that you would like to declare. Seeing none.

**2. Technical contributions**

* IG Chair resumes the technical presentation followed by the Monday session.

**2.1 Preliminary Surface-wave Propagation Characteristics in Metal-rich Environment**

* Jae-Joon working with Electronics and Telecommunications Research Institute (ETRI) in South Korea makes presentation about properties of the surface wave channel. The document number is 15-25-0450-00.
* The presentation mainly focuses on the difference of the surface wave channel compared with the space wave channel. There are three points in the difference:

1) The surface wave is less attenuated with inversely proportional to an increasing distance while the space wave with squared distance.

2) The thickness of dielectric layer affects propagation of the surface wave, so an electric field becomes stronger with a thicker layer.

3) A cross point exists over 6GHz between the attenuation of the space and surface waves.

* The presenter shows test results in a laboratory, in which the surface is propagated on the surface of a 7-m long metal strip. The test results agree well with the modelling ones in terms of the signal attenuation with an increasing distance.

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| **Questions or Comments** | **Answer** |
| Very selective channel for a frequency with narrow coherence bandwidth | * The coherence bandwidth has not been analyzed focusing on the thickness effect.
* The bandwidth property will be presented in the next meeting.
 |
| Should consider the channel properties to design a waveform for SWC | - |

**2.2 Proposal for a PHY frame considering the effect of metal structures on surface wave propagation characteristics**

* SeokBong working with Electronics and Telecommunications Research Institute (ETRI) in South Korea makes presentation about the effects of the metallic structure on the propagation of the surface wave. The document number is 15-25-0442-01.
* The research team has conducted simulations after modelling compartment structures inside a ship. In the simulation, the surface wave leaks out of an air gap with 2-mm thickness, so the surface wave shows short delay compared to the space wave.
* Based on the simulation results, the presenter proposes a PHY candidate suitable for SWC. The proposed PHY supports longer guard interval compared to other PHYs in 802.11.
* For the QPSK modulated signal, an 800-ns guard interval is enough for successive demodulation when the delay spread is 150ns. A demodulation error, however, occurs when the delay spread increases to 400ns. This condition requires modification that the guard interval in PHY increases to 1200ns.

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| **Questions or Comments** | **Answer** |
| Not able to ask 802.11 for any change, e.g., the guard interval, in PHYs | * The coherence bandwidth has not been analyzed focusing on the thickness effect.
* The bandwidth property will be presented in the next meeting.
 |
| Reason to use less access points for SWC | * SWC has a path-loss exponent smaller compared with that of the surface wave.
* SWC experiences less attenuation resulting in a smaller number of access points.
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**3. Next steps and Timeline**

* IG Chair summarizes the next steps for IG. IG still needs to present three important points.

1) Use-cases of SWC

It is still unclear how high data rate and how many access points are required for the ship area network using SWC.

2) A channel model for SWC

It is important for SWC PHY to support long delay spread.

3) Feasibility and market demand.

It is desirable to invite some relevant people to a teleconference meeting to listen to their insights about the feasibility and market demand for SWC.

* IG Chair emphasizes that IG should find out a gap between current PHYs and new requirements for SWC. After the gap is found, three options are available for IG.

1) Defining a new PHY for SWC

2) Modifying current PHY, e.g., expanding 802.15.4 PHY.

* IG Chair proposes that IG publish IG report at WNG in January next year. This IG report defines system requirements for SWC while presenting recommendations. IG Chair encourages IG to finish the IG report by January next year.
* IG Chair notes that it is not required to build a new channel model for SWC as adapting the previous channel model to the surface wave channel. A new channel model, however, could be necessary if the previous models have some missing points.
* IG Chair plans for a teleconference meeting before the November meeting in Bangkok. The teleconference meeting will be held at 03:00pm KST on the 24th of October.
* IG Chair mentions an e-mail reflector. IG Chair will ask 802.15 Chair to build an e-mail reflector. IG Chair advises the floor to subscribe to the e-mail reflector when it is ready.

**4. AoB**

* IG Chair asks the floor if there is any other business to be discussed before recess. Seeing none.

**5. Recess**

* IG Chair recesses the meeting at 05:35 pm local time.

# Annex A Total attendance (in-person + remote) = 23

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| Last Name | First Name | Affiliation |
| Almholt | Thomas | Texas Instruments Inc. |
| Gruber | Josef | Infineon Technologies |
| Hwang | Jung-Hwan | Electronics and Telecommunications Research Institute (ETRI) |
| Hyun | Seok Bong | Electronics and Telecommunications Research Institute (ETRI) |
| Ishihara | Susumu | Shizuoka University |
| Jang | Yeong Min | Kookmin University |
| Kadampot | Ishaque | Qualcomm |
| Kajita | Shugo | Space-Time Engineering Japan; Inc. |
| Kalkundrikar | Vishal | Ondas Networks |
| Kato | Arata | Space-Time Engineering Japan; Inc. |
| Kim | Haksun | Sunny Wave Tech. |
| Kohno | Ryuji | YNU/YRP-IAI |
| Park | Jae-Joon | Electronics and Telecommunications Research Institute (ETRI) |
| Portier | Fabrice | Silicon Laboratories |
| Powell | Clinton | PWC; LLC |
| Robert | Joerg | FAU Erlangen-Nuernberg / Fraunhofer IIS |
| Rodine | Craig | Sandia |
| Sand | Stephan | German Aerospace Center (DLR) |
| Shahar | Menashe | Ondas Networks |
| Suzuki | Takafumi | NICT |
| Wong | Kai Kit | University College London |
| Zeisberg | Sven | ZIGPOS GmbH |
| Zuniga | Juan Carlos | Cisco Systems; Inc. |