

## MEETING NOTES

### **Meeting of the IEEE BPL Study Group**

Marriott Del Mar  
San Diego, California  
January 14, 2005

#### **Participants**

Brett Kilbourne, United Telecom Council/United Power Line Council	Terry Burns, Arizona Public Service (APS)
Shinji Tanabe, Mitsubishi Electric Corporation	Brian Cramer, EPRI T&D
Mike Hazel, Mountain Telecommunications, Inc.	Alex Gelman, IEEE COMSOC/Panasonic
Daniel Garcia, Mitsubishi Electric Corporation	John Newbury, IEEE PSRC/Open University
Gyota Yasoda, Mitsubishi Electric Corporation	Rex Bullinger, National Cable and Telecommunications Association
Gary Stuebing, Duke Power Corporation	Keith Brightfield, Ameren
Philip Poulidis, Intellon	Ram Rao, Ambient
Jim Mollenkopf, Current Technologies	Yehuda Cern, Ambient
Tim Conser, Qwest Communications	Aron Viner, Ambient
Mark Simon, Commonwealth Edison	Clay King, Main.net
Fawzi Isa, EDF	Scott Willy, Spidcom
Michel Godberg, EDF, Chairman of CENELEC	Satoshi Obara, Fujitsu
Steve Green, Amperion	Fred Marks, Academy of Model Aeronautics
Ed Hare, ARRL	Jean-Philippe Faure, Ilevo-Schneider
Larry Fromm, Chaos Telecomm	Electric Powerline Communications
Kevin Norris, Entergy	Brian Rossineist
Barry O'Mahoney, Intel Corporation	Jerry Ramie, ARC Technical Resources
Edward Rashba, IEEE	Steve Oksala, SCTE
	Hong Yu, Aboundi
	Brian Wenger, Earthlink
	George Peponides, Conexant

#### I. Opening remarks

- a. Picking up from October 14<sup>th</sup> meeting in Piscataway, NJ when decided to:
  - i. Develop recommendations for standards
  - ii. White Paper for guidance
- b. Goals for this meeting
  - ii. Review/discuss recommendations and white paper submissions
  - iii. Set course for study group going forward

#### II. Discussion of Recommendations

##### **a. Emissions (Jean-Phillippe Faure)**

- i. Recommendations
  1. support and contribute to international standard on **emissions**
    - a. RF characterization of the power lines

- i. Support the development of the standards work by CISPR, CENELEC, ETSI
      - ii. Need to model the different topologies and model the channels
      - iii. How to standardize measurement techniques
        1. Europe - conducted emissions
        2. USA - loop antenna
      - iv. Study the cross-talk between PLC networks and other networks (i.e., ADSL, LANS, etc.)
    - b. RF measurement on the mains
      - i. How to avoid this interference
        1. Notching
        2. Reduce power
        3. Responsibility of operators and equipment manufacturers to mitigate
      - ii. For equipment
        1. Modems - a lot of work done by CISPR
      - iii. For operators
        1. Need to deliver necessary tools to
          1. Detect interference
          2. Mitigate interference (notching)
  2. ensure high quality power line services through high level of **immunity** from interference
    - a. standards for immunity
      - i. Need to develop standards for immunity of PLC systems
        1. Must maintain service levels, reliability, robustness
          1. Conducted (transients and other line disturbances)
          2. From ingress of external noise sources
    - b. identify sources of potential interference
      - i. Check immunity of existing network operators
        1. Likely interference is with emissions
        2. Unlikely interference by conducted emissions
- ii. Q&A
  1. Scope/Approach
    - e. IEEE should not be assuming role of regulatory bodies.
      - i. Need to balance interests of licensees/industry
  2. International issues
    - a. CISPR working with ETSI on standards
      - i. Coordinate w/ them
    - b. Potential conflict between Europe (conducted) and USA (emissions)

- ii. Suggest different classes of systems and different profiles for different regions

**b. MAC & PHY**

- i. Recommendations: Two submissions
  - 1. Oleg Logvinov (HomePlug) – refrain from developing standards
  - 2. Victor Dominguez (DS2) – work on standards for coexistence and interoperability
- ii. Related developments
  - 1. New orgs – Universal Powerline Association and Mitsubishi/Sony/Matsushita (CE Powerline Alliance) developing standards
- iii. Presentation on behalf of the Universal Powerline Association (Jean-Philippe-Faure) (See presentation on IEEE website)
  - a. Why UPA
    - i. World-wide unifying standards for powerline communications
    - ii. Integrating PLC into the telecommunications landscape
      - 1. Taking a universal view of the market and embracing all applications
    - iii. Ensuring speed of deployment of PLC
  - b. Mission
    - i. Propose specifications and to standards making bodies
    - ii. Issue Coexistence and Interoperability specifications
    - iii. Promote worldwide deployment of interoperable and coexisting PLC networks
    - iv. Educate decision makers, government, industry, and society provide forum to strengthen international cooperation to nurture and grow emerging PLC market
  - c. Goal is to help all powerline initiatives
    - i. No geographical frontier
    - ii. Welcomes all players representing all links of the value chain
    - iii. UPA takes into account all PLC based applications
      - 1. UPA is Universal
  - d. Founders
    - i. More companies joining
    - ii. 3 Working Groups launched
- iv. Q&A re: UPA
  - 1. Explanation of the difference between PROPOSING and ISSUING specifications
    - a. Propose = direct feed into CENELEC/ETSI/OPERA
    - b. Issue = Set standards for coexistence/interoperability
  - 2. Relationship with PLCForum
    - a. PLCForum states that it is focused on in-home and Access
    - b. UPA believes PLCForum is geographically limited, and is not currently working on coexistence.
    - c. PLCForum/UPA willing to work with each other

- v. Presentation on behalf of COMSOC, (Alex Gelman)
  - a. In response to the announcements - they are all industry forums
  - b. IEEE- SA offers completely open, independent, and most inclusive
  - c. Position of COMSOC
    - i. IEEE Communications Magazine
    - ii. JSAC PLC Special Issue
    - iii. At GLOBECOM 2004 created PLC Technical Committee
    - iv. ComSoc liaison to standards
    - v. ComSoc technically cosponsored ISPLC 2005
    - vi. BoPL study groups have been created
    - vii. Current major issue - Launching PAR for PLC PHY & MAC
    - viii. ComSoc will cosponsor PHY and MAC
  - d. Q&A
    - i. This should not be put into 802 family
      - 1. ComSoc will concede control to Computer Society
    - ii. Should go into Corporate
    - iii. Brian W.: 802 is the standards for LAN and MAN and therefore a natural fit
    - iv. Jim M.: ComSoc will be involved
- c. **Safety & Construction (Yehuda C., Terry Burns) (see recommendation on IEEE website)**
  - i. Looked at Safety issues in a broad manner of all risks
  - ii. Looked at all existing standards for safety
  - iii. 85 to 90% can be handled by existing standards - remainder may need to be established
  - iv. Example: couplers falling down - how to cover
  - v. Electrical issues handled by pin-insulator standards (flashover,
  - vi. Need for participation from Utility staff to contribute applicable standards and their logic and reasons for the standards
  - vii. Approximately 20 different hazards need to be addressed
  - viii. Report of the P1675 Hardware and Installation BPL Working Group (Terry Burns)
    - 1. P1675 Resides within Power Engineering Society; PAR drafted.
      - a. Hardware
        - i. Criteria for a device (coupler) to satisfy requirements to install on a distribution system
          - 1. Should not cause harm or be harmed in the environment in which it is installed
          - 2. Can be universal
      - b. Installation
        - i. Installation practices
          - 1. Not "safety"
          - 2. May only be regionally applicable
          - 3. Cindy Bambini will be chairing subgroup
  - ix. Generally accepted the approach of borrowing from existing standards wherever possible

- x. Q&A:
  - 1. Harmonization with environments in Europe and elsewhere
    - a. Each environment is being treated separately
  - 2. Refer to CENELEC safety standards document
    - a. Copies available for purchase
- d. **Media (Aron Viner)(see recommendation on IEEE website)**
  - i. Characterization of the media recognizes that:
    - 1. Grid not built for communications
    - 2. No existing standards exist for measuring/predicting channels
    - 3. Need common techniques for measurement and characterization
  - ii. Other Resources:
    - 1. ETSI document exists for some of this and should be considered as starting point
    - 2. Academic sources data exists
  - iii. Deliverable:
    - 1. Output will more likely be a guide rather than standard for predicting channel characteristics as well as for predicting RF emissions
    - 2. Recommendation developed with Bruce Renz of Amperion
  - ii. Q&A
    - 1. OPERA group is working in this area - have developed protocol for measuring PLC systems
    - 2. Other academic sources: Recent Penn. State report on modeled channel
    - 3. EPRI has a project underway in similar area
- e. **Education (John Newbury)**
  - i. Need to have Electrical, Electronic, Computer, Communications, DSP, physics (mitigation for interference) knowledge
  - ii. Need experimental background - not just theory
  - iii. How should this be done?
    - 1. People who have been taken into utilities lately are with communications, IT type background
    - 2. This could be the next component of ABET accreditation

### III. Stakeholder Positions

#### a. **Amateur radio concerns (Ed Hare/Steve Greene)**

- i. Ed Hare
  - 1. FCC regulations dictate what to do - not this document
  - 2. Missing in the document as it stands
    - a. Section pointing to FCC resources using specific local users - radio receivers
- ii. Steve Greene
  - 1. The document has not been published because there's still some significant disagreements on some points
    - a. Whether or not potentially used bands must always be notched out
    - b. Depends on the purpose of this White Paper

- iii. Q&A - Discussions
    1. Jim M.: The understanding was that this White Paper was to contain recommendations to create standards
    2. General agreement that this paper/information is not appropriate and not in the spirit of this group's efforts
    3. Alex G. : IEEE should not/does not contribute/advise government as to what regulations should be
    4. AV: This
    5. 802 and PES do deal with government agencies and provide information towards standards/rules
    6. SG: The document does contain a lot of useful information and references however the problems are where the policy statements are included
  - iv. Clearly disagreements - discussions tabled till afternoon
  - b. Safety ( Yehuda Cern) (See presentation on IEEE website)**
    - i. Reduce cost while maintaining safety
    - ii. LV equipment already covered by existing standards
    - iii. MV - Overhead
      1. Hardware - (Inductive and Capacitive couplers)
        - a. Electrical
        - b. Mechanical
        - c. Thermal
      2. Installation
    - iv. MV - Underground
      1. Hardware - (Inductive and Capacitive couplers)
        - a. Electrical
        - b. Mechanical
        - c. Thermal
      2. Installation
    - v. Q&A
      1. Testing (and procedures for testing) is not covered sufficiently
  - c. Access/In-home compatibility (Brian Wenger on behalf of Oleg Logvinov)(See submission on IEEE website.)**
    - i. Q&A
      1. Coexistence and Interoperability
      2. Why is Frequency Division left out? It was in previous versions.
      3. Is/Will HomePlug offering their specification to a standards body?
      4. AV: This document describes one "standard" or technology, is this appropriate for this paper?
      5. Should this group propose a Coexistence and an Interoperability standard?
- IV. Lunch - Presentation by Ed Rashba/IEEE (See presentation on IEEE website)
- a. Corporate Program
    - i. Can get a standard completed in 12 to 18 months
    - ii. Example - IEEE 1625: Mobile Battery Standard
      1. Created in 17 months

## V. Stakeholder Positions

- a. **Service Management (Brian W.)(See presentation on website)**
  - i. Paper distributed
- b. **Technology Suppliers (Jim Mollenkopf) (See presentation on IEEE website).**
  - i. IEEE standards Efforts Must:
    1. Be focused on problems with defined scope
    2. Address key issues
    3. Not duplicate regulatory functions
    4. Make progress quickly
  - iii. Compatibility with other wireline services (Jeff Bosiner – absent, discussion deferred).
    1. Participants recognized that there might be an issues with collocated devices/RF, such as meter reading technologies.
- d. **PLC professional profile (John Newbury)**
  - i. Retraining people with updating courses
  - ii. Established summer programs/tutorials
  - iii. Will draft submission
- e. **Security and privacy, authentication (Brian Wenger)(see presentation on IEEE website).**
  - ii. Q&A
    1. Should this cover vandalism (interference by knocking out the network)
- f. **Compatibility with wireless services (Fred Marks)(see presentation on IEEE website)**
  - i. Presented paper
  - ii. Q&A: whether concerns exist w/interference to unlicensed devices.
- g. **Utility interests (Mark ComEd)**
  - i. Latency - important if system is used for internal applications

## VI. BPL

- a. **Consumer Use Case (Alex Gelman)(see presentation on IEEE website).**
  - i. Q&A
    1. Assumption is that ALL meters will be replaced
    2. Jim M.: Consensus will be difficult to reach on the prioritization of CE requirements over Access
    3. Aron V.: This is not appropriate for this White Paper as it does not represent a common view
    4. Brian W.: Since the CE technology needs to take into consideration multiple home users, why can't it also accommodate Access as another application?
    5. Question regarding low impedance points in the house?
    6. Ed H.: Is the content of this paper appropriate for the White Paper?
      - a. AG: We should not preclude controversial positions, just only ones that are anti-IEEE
- b. **Business Use Case (Keith Brightfield)(see presentation on IEEE website)**
  - i. Paper distributed in packet
- c. **Utility Services Use Case (Ram Rao)**

- i. Request to include a list of services
- d. Possible service architectures and service value chains (K. Brightfield)**
  - i. Attempting to get permission from David Sphigler for use of his paper/matrix
- e. System elements and associated possible service (Victor Dominguez – absent, discussion deferred).**
  - i. PLC and other applicable standards and specifications map (Aron)
    - 1. Previously distributed
- f. Summation of Standards Efforts (Terry Burns)**
  - i. Five areas determined as needing standards/guides
    - 1. Construction/Safety change to Hardware & Installation - addressed by PES1675
    - 2. MAC & PHY - addressed by ComSoc
    - 3. Media - no clear path
      - a. Do we need a standard for media (Antenna and Propagation Society?)
        - i. General consensus is a combination of ComSoc and T&D (and A&P and EMC too?)
        - ii. EPRI document 1001891 - Nov. 2001
    - 4. Emissions - no clear path
      - a. Do we need a standard for emissions - EMC? (with PES?)

## VII. Next steps

### **a. Recommendations/Whitepaper**

- i. The Study Group agreed to divide into subgroups to address issues for recommendations and whitepapers. The subgroups will develop PARs as appropriate for the respective issues and will finalize submissions for the whitepaper that are relevant to the subgroup. The following groups were created with the following chairpersons.
- ii. Emissions/EMC
  - 1. Chair – Aron Viner
  - 2. Participants
    - a. Brian Cramer, EPRI T&D
    - b. Ed Hare, ARRL
    - c. Fred Marks, Academy of Model Aeronautics
  - 3. Next Steps
    - a. Bring all contributions to subgroup
      - i. Compatibility with wireless
      - ii. Compatibility with wireline services
      - iii. Immunity
    - b. Sponsor: PES (PSCC)
- iii. MAC & PHY
  - 1. Lead candidates - Co-chairs: Jim M., Jean-Phillipe Faure
  - 2. Participants
    - a. Brian Wenger, Earthlink
    - b. Phillip Poulidis, Intellon
    - c. Scott Willy, Spidcom

- d. Larry Fromm, Chaos Telecomm
  - e. Ram Rao, Ambient
  - 3. Issues
    - a. Access and In-home compatibility
    - b. Security and privacy, authentication
    - c. Service management
  - iv. Safety & Construction
    - 1. Handled by P1675
    - 2. Chair – Terry Burns
      - a. Chair Installation Subgroup – Cindy Bambini
      - b. Chair Hardware Subgroup – Yehuda Cern
  - v. Media
    - 1. Chair - Bruce Renz
    - 2. Participants
      - a. Ed Hare
  - vi. Education
    - 1. Chair - John Newbury
  - b. Deadlines
    - i. PAR - by March
      - 1. Feb. 2 if it is to be considered in the March Stds. Committee for acceptance
    - ii. Whitepaper – 30 days
  - c. Membership structure for respective subgroups: Corporate vs. Individual
    - iii. To be decided by each individual group
  - d. Continuing role for Study Group
  - e. Whitepaper
    - i. Not required for SA process
- VIII. Next meeting
- a. The Study Group considered various options including Vancouver in conjunction with the ISPLC conference in April, Long Beach, CA in conjunction with the UTC Annual Conference in May and Piscataway, NJ as a stand alone event. Participants were divided on the location, and it was tentatively decided to hold the meeting in Piscataway, pending further discussion with IEEE and with UTC about the logistics of holding the meeting in Long Beach.
- IX. Next Chair
- a. Brett Kilbourne