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

I. Opening remarks
   a. Picking up from October 14th 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-Philippe 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 (Víctor Domínguez – 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