ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 10, Issue, 05, pp.69445-69448, May, 2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

EFFECTIVE SPECTRUM RESOURCE SHARING WITH DYNAMIC HANDOFF AND OPTIMIZED COST FIXATION IN COGNITIVE RADIO

[1]Dilsath Begum, M. and [2]Sulthana Begam, M.

[1]Department of Computer Science and Engineering, SCSVMV, Enathur, Kanchipuram, Tamilnadu, India
[2]Research Scholar, Department of Zoology, Thiruvalluvar University, Serkadu, Vellore, Tamilnadu, India

ARTICLE INFO

Article History:
Received 22nd February, 2018
Received in revised form
08th March, 2018
Accepted 22nd April, 2018
Published online 30th May, 2018

Key words:
Automatic Generation Control (AGC);
Cognitive Radio (CR);
Dynamic Spectrum;
Handoff Scheme; Smart Grid.

Corresponding author:

ABSTRACT

Its great potential to improve the overall performance of data transmission with its dynamic and adaptive spectrum allocation capability in comparison with many other networking technologies, cognitive radio (CR) networking technology has been increasingly employed in networking and communication infrastructures for smart grids. However, a secondary user (SU) of a CR network has to be squeezed out from a channel when a primary user reclaims the channel, which may occur in a randomized fashion. The randomness of the appearance of licensed users, disruptions to both licensed and unlicensed communications are often difficult to prevent. So traffic may cause packet losses and delays for secondary user's data. Primary users (PU) are the users who are licensed with certain bands of the current spectrum, while secondary users (SU) do not have the licenses for the utilization of those spectrum bands. SU sensed channel state is either free or occupied by other users based on checking ON or OFF state of communication channel using Automatic Generation Control (AGC) of smart grid. It implement two implementations logic. 1. Request to the server where resource is allotted to the secondary user if primary user is not available. Handoff scheme is implemented when primary user comes in the picture. 2. Request to the primary user here main server plays a role in fixing the optimum cost & identification of best primary user based on recommendation scheme incentives are provided to the best primary user as well as secondary user who have given the feedback.

Citation: Dilsath Begum, M. and Sulthana Begam, M. 2018. "Effective spectrum resource sharing with dynamic handoff and optimized cost fixation in cognitive radio", *International Journal of Current Research*, 10, (05), 69445-69448.

INTRODUCTION

ASMART grid integrates advanced two-way communication networks and intelligent computing technologiesinto current power systems, from large-scale generation through delivery units to electricity Consumers (Farhangi, 2010 and Amin, 2005). Theapplications of a smart grid include wide-area monitoring, control and protection (WAMCP), distributed generation management, advanced metering infrastructure (AMI), real-time pricing (Karlsson, 2004 and Bouhafs, 2012). To support these applications, there are several unique challenges to be addressed for smart grid communications (Gungor, 2012; Gungor, 2006 and Gungoret, 2011). First of all, since WAMCP and AMI involve tremendous amounts of information exchange over wide geographical areas, it needs large bandwidths for both data transmission and collection. Secondly, as most of AMI communication architectures are formed among smart meters for data routing in the 2.4 GHz industrial, scientific, and medical (ISM) band, signal interferences will be severe among these types of radio systems.

Last but not least, because a smart grid communication architecture consists of wide area network architecture (WAN), neighborhood area network architecture (NAN) and home area network architecture (HAN), these heterogeneous network architectures require the capability to coordinate communications within each subarea and between different areas. However, most of the traditional communication technologies are infeasible to me*et al*l these requirements. Due to its great potential to enhance the overall performance of data communications with its dynamic and adaptive spectrum management capabilities, the cognitive radio (CR) network has been increasingly considered as the networking and communication infrastructure for smart grids (Gungor, 2012; Gungor, 2006; Qiu, 2011). In view of the fact that a large portion of the licensed radio spectrum remains severely under-utilized, the CR technology is proposed to achieve the efficient usage of the assigned radio spectrum (Wang, 2011; Wang, 2010; Su, 2008; Geirhofer, 2007). In a CR network, there are two kinds of users. Primary users (PUs) are the users who are licensed with certain bands of the current spectrum, while secondary users (SUs) do not have the licenses for the utilization of those spectrum bands. However, SUs can opportunistically sense and identify the unused channels in the licensed spectrum. Based on the sensed results, SUs are able to use the available channels, coordinate the spectrum access with other users, and return the channel back to PUs when PUs reclaim the spectrum. With the capability of the dynamic and opportunistic spectrum allocation, CR networks can increase spectrum efficiency, enable different large-scale spectrum regulations, and coordinate radio spectrum sharing among different area networks in smart grids. Although CR networks have great potential to address the unique challenges for smart grid communications in comparison with many other networking technologies, they bring in a new problem. Specifically, a SU of a CR network has to be squeezed out from the channel that it is using when a PU reclaims the channel, this may occur in a randomized fashion. The random interruption of SU traffic will unavoidably cause packet loss for SU data. The lost data packet can be of any nature: control commands from control centers to substations, sensed data from remote terminal units (RTUs), real-time pricing information between utilities and customers, etc. The loss of data packets may lead to very severe and adverse effects on the management and control of a smart grid (Shahraeini, 2011). In it is emphasized that communication failures in a power grid may cause very serious problems for both system operation and control. In (Zhang, 2013) it is noticed that communication failures can interrupt the wide area damping control of power systems. In (Liu, 2011) it is found that communication topology changes among distributed damping controllers can jeopardize the power system performance. In (Xin, 2011 and Dominguez-Garcia, 2012) it is reported that the reliability of the cooperative control of distributed energy resources (DERs) in distribution networks can be degraded by communication failures in communication channels. In (Liu, 2014), the dynamic performance of the automatic generation control (AGC) of a four-area power system is found to greatly depend on communication topologies among local-area controllers.

Literature Survey: Farhangi (Karlsson, 2004), proposed the exciting rapid changes leaves us a challenging times ahead. Hence the rise in cost, use of mass data on everyday life and some periodic changes determine the speed of transformation. Regardless of quick various utilities embraces the smart grids concept technology and system, all agree the inevitability of this massive transformation. D.Karlsson *et al* (Karlsson, 2004) proposed This describes the transition from Phasor-based wide area measurement to real time monitoring control, protection. The power spectrum analysis deals are reviewed and their key concept in control and protection are addressed along with respective principles and architectures. Examples of analysis tools, monitoring tools and concepts of control are protection are given. X.Ye *et al* (Ye, 2010), proposed The modeling and stabilizing control of NCS without stochastic packet loss and time-varying delays are addressed. Sufficient conditions for the stochastic stabilization of NCS with packet loss and time varying delays are obtained via mode-dependent Lyapunov function method.

Existing System: In existing systems, Due to the randomness of the appearance of licensed users, disruptions to both licensed and unlicensed communications are often difficult to prevent. So traffic may cause packet losses and delays for secondary user's data.

Disadvantages of Existing System

- Congestion occurring
- Time consuming process
- Less effective
- Low connectivity
- High cost

Proposed System

In the proposed system, primary users (PU) are the users who are licensed with certain bands of the current spectrum, while secondary users (SU) do not have the licenses for the utilization of those spectrum bands. SU sensed channel state is either free or occupied by other users based on checking ON or OFF state of communication channel using Automatic Generation Control (AGC) of smart grid. It implement two implementations logic. 1. Request to the server where resource is allotted to the secondary user if primary user is not available. Handoff scheme is implemented when primary user comes in the picture. 2. Request to the primary user here main server plays a role in fixing the optimum cost & identification of best primary user based on recommendation scheme incentives are provided to the best primary user as well as secondary user who have given the feedback.

Advantages of Proposed System

- Avoid Congestion
- User friendly
- Less Time consuming process
- More effective
- Low cost

Algorithm/Methodology

Handoff : Request to the server where resource is allotted to the secondary user if primary user is not available. Handoff scheme is implemented when primary user comes. Dynamic handoff technique is allocating the resources to the secondary user by simultaneously connecting to another spectrum while the primary user comes, also said to be soft handover or soft handoff.

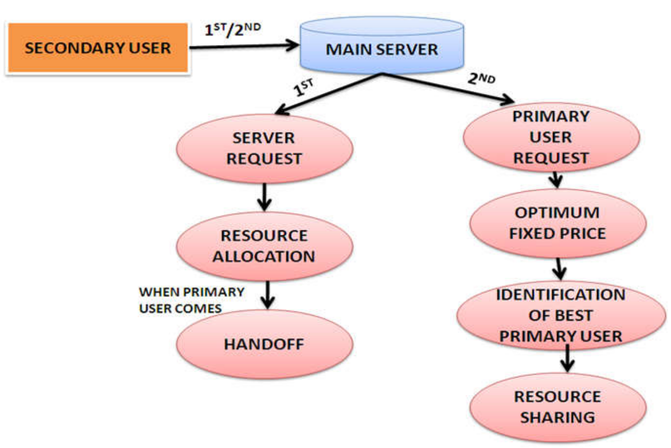
Optimized Cost: Request to the primary user here main server plays a role in fixing the optimum cost & identification of best primary user based on recommendation scheme incentives are provided to the best primary user as well as secondary user who have given the feedback.

Bayesian Rule – Based Algorithm

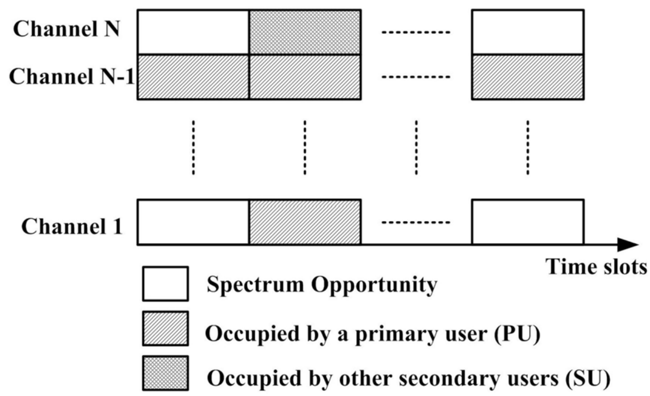
LBR(Att, Dtraining ,Etest)
INPUT: Att: a set of attributes,
Dtraining : a set of training examples described using Att and classes,
Etest: a test example described using Att.
OUTPUT: a predicted class for Etest.
LocalNB = a naive Bayesian classifier trained using Att on Dtraining
Errors = errors of LocalNB estimated using N-CV on Dtraining
Cond = true
REPEAT
TempErrorsbest = the number of examples in Dtraining + 1
FOR each attribute A in Att whose value vA on Etest is not missing DO
Dsubset = examples in Dtraining with A = vA

TempNB = a naive Bayesian classifier trained using Att − {A} on Dsubset
TempErrors = errors of TempNB estimated using N-CV on Dsubset +
errors from Errors for examples in Dtraining − Dsubset
IF ((TempErrors<TempErrorsbest) AND
(TempErrors is significantly lower than Errors))
THEN
TempNBbest = TempNB
TempErrorsbest = TempErrors
Abest = A
IF (an Abest is found)
THEN
Cond = Cond ∧ (Abest = vAbest)
LocalNB = TempNBbest
Dtraining = Dsubset corresponding to Abest
Att = Att − {Abest}
Errors = errors of LocalNB estimated using N-CV on Dtraining
ELSE
EXIT from the REPEAT loop
classifyEtest using LocalNB
RETURN the class

Architecture Diagram: First the User wants to create an account and then only they are allowed to access the Network. Once the User creates an account, they are allowed to login into their account to access the application. Based on the User's request, the Server will respond to the User. All the User details will be stored in the Database of the Server. The Server will monitor the entire User's information in their database and verify them if required. The Server will update the each User's activities in its databasethat are more dynamic and responsive to their local environments and will authenticate each user before they access the Application hence,it will prevent the Unauthorized User access. A standard paradigm for the allocation of wireless resources in communication demands symmetry, whereby all users are assumed to be on equal footing and hence get equal shares of communication capabilities.A monetary gift provided to a spectrum based on performance, which is thought of as one way to entice the service to continue delivering positive results. It implements the how the spectrum allocation is going to fix the max rate for the specified frequency based on the type of the user.

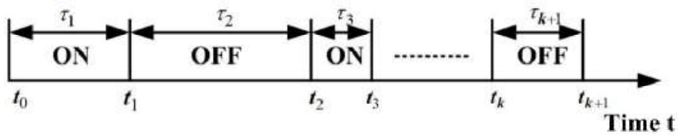


A licensed spectrum bandconsisting of N non-overlapping channels in the CR networkused by the smart grid. Both PUs and SUs in this radio networkare operated synchronously in a time-slotted fashion. It considers the situation in which each cognitive user can sense onlyone channel at each time slot. The availability of each channelis modelled as a 2-state Markov chain (MC) in [1,2,8].However, in terms of the system performance of a smart grid,we should take account of not only the state transitions, butalso the time staying in each state. From each SU point ofview, the sensed channel state is either free or occupied.



CR channel illustration

This means the communication channel for data exchange is either ON or OFF. Thus, it model the communication channel as an ON–OFF switch with sojourn times. A sojourn time $\tau i$is a time interval the communication channel continuously stays in a state, either ON or OFF [30]. Let the channel state at kth time in stantdenoted by θk∈_ = {0, 1}, where _ = {0, 1} is the state space of θk, 0 denoting OFF state of the channel, 1 denoting ON state.



Proposed On–Off cognitive channel model

Conclusion

In this paper, we investigated a general problem for maximizing the system throughput using cooperative sensing in cognitive radio networks. To solve it, we formulated a sensing decision problem of maximizing the system throughput. The first problem we considered is the unconstrained problem of maximizing the weighted sum of the PU and SU throughput in the cognitive radio system. We developed a Bayesian rule-based algorithm to find the optimal decision. To guarantee a minimum PU throughput, we then studied a system throughput maximization problem with PU throughput constraint.

REFERENCES

Amin, S. M. and Wollenberg, B. F. 2005. "Toward a smart grid: Power delivery for the 21st century," IEEE Power Energy Mag., vol. 3, no. 5, pp. 34–41, Sep./Oct.

Bouhafs, F., M. Mackay, and M. Merabti, "Links to the future: Communication requirements and challenges in the smart grid," IEEEPower Energy Mag., vol. 10, no. 1, pp. 24–32, Jan./Feb. 2012.

Dominguez-Garcia, A. Hadjicostis, C. and Vaidya, N. 2012. "Resilient networkedcontrol of distributed energy resources," *IEEE J. Sel. AreasCommun.*, vol. 30, no. 6, pp. 1137–1148, Jul.

Farhangi, H. 2010. "The path of the smart grid," IEEE Power Energy Mag., vol. 8, no. 1, pp. 18–28, Jan./Feb.

Geirhofer, S., Lang, T. and Sadler, B. 2007. "Cognitive radios for dynamic spectrumaccess—Dynamic spectrum access in the time domain: Modelingand exploiting white space," *IEEE Commun. Mag.*, vol. 45, no. 5,pp. 66–72.

Gungor V. *et al*. 2011. "Smart grid technologies: Communication technologies and standards," IEEE Trans. Ind. Inf., vol. 7, no. 4, pp. 529–539.

Gungor, V. and Lambert, F. 2006. "A survey on communication networks for electric system automation," Comput. Netw., vol. 50, no. 7, pp. 877–897.

Gungor, V. and Sahin, D. 2012. "Cognitive radio networks for smart grid applications: A promising technology to overcome spectrum inefficiency," IEEE Veh. Technol. Mag., vol. 7, no. 2, pp. 41–46.

Karlsson, D., Hemmingsson, M. and Lindahl, S. 2004. "Wide area system monitoring and control-Terminology, phenomena, and solution implementation strategies", IEEE Power Energy mag., vol.2,no.5,pp.68-76.Sep./Oct.2004.

Liu, J., Gusrialdi, A. Hirche, S. and Monti, A. 2011. "Joint controllercommunicationtopology design for distributed wide area dampingcontrol of power system," in *Proc. 18th IFAC World Congr.*, Milan,Italy, Aug. 2011, pp. 519–525.

Liu, S., Liu, X. P. and Saddik, A. E. 2014. "Modeling and distributed gainscheduling strategy for load frequency control in smart grids with communicationtopology changes," *ISA Trans.*, vol. 52, no. 2, pp. 454–461.

Qiu *et al.*, R. 2011. "Cognitive radio network for the smart grid: Experimentalsystem architecture, control algorithms, security, and microgridtestbed,"*IEEE Trans. Smart Grid*, vol. 2, no. 4, pp. 724–740.

Santacana, E., Rackliffe, G., Tang, L. and Feng, X. 2010. "Getting smart," IEEE Power Energy Mag., vol. 8, no. 2, pp. 41–48, Mar./Apr. 2010.

Shahraeini, M., Javidi, M. and Ghazizadeh, M. S. 2011. "Comparison betweencommunication infrastructures of centralized and decentralized widearea measurement systems," *IEEE Trans. Smart Grid*, vol. 2, no. 1,pp. 206–211.

Su, H. and Zhang, X. 2008. "Cross-layer based opportunistic MAC protocolsfor QoSprovisionings over cognitive radio wireless networks," *IEEEJ. Sel. Areas Commun.*, vol. 26, no. 1, pp. 118–129, Jan.

Wang, B. and K. J. R. Liu, 2011. "Advances in cognitive radio networks:A survey," *IEEE J. Sel. Topics Signal Process.*, vol. 5, no. 1, pp. 5–23, Feb. 2011.

Wang, B. and Liu, K. J. R. 2010. "Spectrum sharing in cognitive radio networkswith imperfect sensing: A discrete-time Markov model," *Comput. Netw.*,vol. 54, no. 14, pp. 2519–2536, Oct. 2010.

Xin, H., Qu, Z. Seuss, J. and Maknouninejad, A. 2011. "A self organizingstrategy for power flow control of photovoltaic generators in a distributionnetwork," *IEEE Trans. Power Syst.*, vol. 36, no. 3, pp. 1462–1473.

Ye, X., Liu, S. and Liu, P.X. 2010. "Modeling and stabilization of networked control system with packet loss and time-varying delays", IET Control Theory Appl., vol.4, no.6,pp.1094-1100.

Yu, R. *et al.*, 2011. "Cognitive radio based hierarchical communicationsinfrastructure for smart grid," *IEEE Netw.*, vol. 25, no. 5,pp. 6–14, Sep./Oct. 2011.

Zhang, S. and Vittal, V. 2013. "Design of wide-area power system dampingcontrollers resilient to communication failures," *IEEE Trans. PowerSyst.*, vol. 28, no. 4, pp. 4292–4300.

****