Journal of Southeast University (English Edition) Vol. 27, No. 4, pp. 370 – 374 Dec. 2011 ISSN 1003—7985

Traffic-aware static channel assignment algorithm in wireless mesh networks

Tao Jun Liu Jin Shao Birui Liu Zhijie

(Key Laboratory of Computer Network and Information Integration of Education of Ministry, Nanjing 210096, China)
(School of Computer Science and Engineering, Southeast University, Nanjing 210096, China)

Abstract: A channel assignment algorithm with awareness of link traffic is proposed in multi-radio multi-channel wireless mesh networks. First, the physical interference model based on the signal-to-interference-plus-noise ratio and successful transmission condition is described. The model is more suitable for a wireless communication environment than other existing models. Secondly, a pure integer quadratic programming (PIQP) model is used to solve the channel assignment problem and improve the capacity of wireless mesh networks. Consequently, a traffic-aware static channel assignment algorithm (TASC) is designed. The algorithm adopts some network parameters, including the network connectivity, the limitation of the number of radios and the successful transmission conditions in wireless communications. The TASC algorithm can diminish network interference and increase the efficiency of channel assignment while keeping the connectivity of the network. Finally, the feasibility and effectivity of the channel assignment solution are illustrated by the simulation results. Compared with similar algorithms, the proposed algorithm can increase the capacity of WMNs.

Key words: multi-radio multi-channel wireless mesh network; static channel assignment; traffic-aware
doi: 10.3969/j. issn. 1003 – 7985. 2011. 04. 005

Wireless mesh network (WMN) is a kind of network, which is composed of nodes with mesh distribution. The WMN can implement the interconnectivity among mesh nodes (routers and end users) through automatic discovery, network topology self-maintenance and multi-hop routing. The WMN can improve the coverage and flexibility of the network through multi-hop routing mechanisms. Thus, WMN networks provide a new technology scheme for broadband Internet access, wireless local area network coverage and the low-cost network connection of static and mobile user terminals.

In the WMN environment with a shortage of communication resources and frequent conflicts, it is very important to rationally schedule and utilize the limited channel resources. Traditional WMNs mainly adopt the single radio and single channel technology. There exists interference between two neighbor nodes, which decreases the capacity of the whole network. Currently, more researches have focused on the multi-radio and multi-channel technology [1] which is more suitable for WMNs. However, most existing channel assignment algorithms implicitly suppose that the traffic of every link is uniformly distributed. All links are active. Actually, the traffic is aggregated near the gateway nodes. In this paper, a centralized traffic-aware static channel assignment algorithm (TASC) which is based on the traffic measurement and predictions on WMN links is provided.

1 Related Work

The research of channel assignment technology refers to connectivity, interference, topology, load, cost of switching channels, control methods and so on. Nowadays, existing channel assignments include the following solutions. With the design of effective channel utilization, Leung et al. [2] provided a heuristic algorithm using 0-1 programming to represent the problem of channel assignment in WMNs based on 802.11 protocols. However, the high complexity of effective channel utilization computing increases system cost. Subramanian et al. [3] proposed a centralized channel assignment algorithm, MICA, based on the heuristic algorithm with the target to minimize network interference. But, without common channel assistance, the MICA algorithm brings a large additional cost for controlling. The RCL algorithm[4] describes a channel assignment scheme that maximizes the overall network throughput by considering the fairness constraints on the allocation of the scarce wireless capacity among mobile clients. However, the RCL algorithm is suitable for the backbone network of WMNs and does not take moving nodes (routers/clients) into account. In Ref. [5], the channel interference is divided into coordinated and non-coordinated interference. The comparison of the transmission loss rate and channel assignment fairness between the coordinated and the non-coordinated interference is presented. The CCAS algorithm is a cluster-based channel assignment scheme that minimizes both the non-coordinated interference and the coordinated interference[6]. Whereas, it is hard for the CCAS algorithm to rapidly reflect the changes of backbone network topology.

Furthermore, some researchers have tried to use linear programming to solve the channel assignment problem in multi-radio multi-channel WMNs. Nasser et al. [7] proposed an integer linear optimization model, which minimizes the competition and the interference by reducing the number of the competition and the interference links. But the application scenario is affected by its simple interference model. The objective in Ref. [8] is to find a static channel

Received 2011-07-04.
Biography: Tao Jun (1975—), male, doctor, associate professor, juntao@seu.edu.cn.
Foundation items: The National Basic Research Program of China (973 Program) (No. 2009CB320501), the Natural Science Foundation of Jiangsu Province (No. BK2010414), China Postdoctoral Science Foundation (No. 20100480071), Specialized Research Fund for the Doctoral Program of Higher Education (No. 20090092120029).
Citation: Tao Jun, Liu Jin, Shao Birui, et al. Traffic-aware static channel assignment algorithm in wireless mesh networks[J]. Journal of Southeast University (English Edition), 2011, 27(4): 370 – 374. [doi: 10.3969/j. issn. 1003 – 7985. 2011. 04. 005]

assignment method, which maximizes the number of links that can be activated simultaneously with interference constraints. Zhou et al.[9] proposed an integer quadratic programming (IQP) model to minimize the average network interference. Nevertheless, the local severe interference, which may cause damage to wireless communications, is ignored. Sridhar et al.[10] provided an ILP formulation for channel assignment and presented a Lagrangian heuristic algorithm to find the near-optimal feasible solution. However, the protocol interference model is too simple to be adopted.

In this paper, the traffic-aware static channel assignment model is studied by adopting the physical interference model in multi-radio multi-channel WMNs. Then, a pure integer programming method (PIQP) is adopted to achieve channel assignment for the optimal capacity of WMNs. Finally, the implementation and simulation of the TASC algorithm are given.

2 System Model

2.1 Network model

We use $G=(V,E)$ to represent a WMN, where V is a set with n mesh nodes, $n=|V|$, and E is a set with m communication links, $m=|E|$. $v(\forall v\in V)$ is equipped with multiple radios. $e(\forall e\in E)$ is a bidirectional communication link. R_v represents the number of radios on node v. K represents the available channels in the WMN, where $K=\{k_1,k_2,\dots,k_N\}$. The number of available channels is N, $N=|K|$.

To simplify the process of channel assignment, we suppose that each node has the same transmitter power P_0. $\boldsymbol{L}(u,v)$ is the signal level which the receiver v detects from sender u. G_{uv} is the signal level gain from the sender u to the receiver v. Therefore, $\boldsymbol{L}(u,v)$ is proportional to P_0 and G_{uv}, $\boldsymbol{L}(u,v)=\alpha P_0 G_{uv}$, where α is a proportionality constant. G_{uv} is related to some characteristics of the WMN, such as channel frequency, path loss, transmission distance, etc.

In the multi-radio multi-channel WMN, the network interfaces on each node may have different modulation mechanisms and frequency bandwidths. Here, $\boldsymbol{W}=\{w_1,w_2,\dots,w_{|V|}\}$ is defined as a frequency bandwidth vector to compute global communication capacity.

2.2 Interference model

Definition 1 (signal to interference plus noise ratio, SINR) For link (u,v), SINR_{uv}[11] of node v is

$$\mathrm{SINR}_{uv}=\frac{\boldsymbol{L}(u,v)}{N_v+\sum\limits_{x\in V'_{uv}-\{u\}}\boldsymbol{L}(x,v)}$$

where N_v is the background noise level around receiver v; $\boldsymbol{L}(u,v)$ represents the signal quality received by v from sender u. $\sum\limits_{x\in V'_{uv}-\{u\}}\boldsymbol{L}(x,v)$ is the accumulative interference intensity. Node x is one of the neighbors of v and shares the same channel with v. V'_{uv} is the real interference neighbor, which will be further discussed in section 3.2.

Definition 2 (successful transmission condition, STC) According to Definition 1, if and only if $\mathrm{SINR}_{uv}\geqslant\lambda_v$ and $\mathrm{SINR}_{vu}\geqslant\lambda_u$ are both satisfied, the packets sent by the sender u will be successfully received by v, and the ACK packets sent by v can be successfully received by the sender u, and vice versa. The STC is

$$\mathrm{SINR}_{uv}\geqslant\lambda_v,\ \mathrm{SINR}_{vu}\geqslant\lambda_u$$

where λ is the minimum signal-to-interference-plus-noise ratio, which can be determined by the expected link load of the network according to the Shannon formula.

The STC reflects the essential characteristic of the physical interference model. In fact, the transmission can complete when there exists some interference on the wireless link as long as the existing interference does not affect the STC. In the STC, the real application situation and the interference cumulative effect are considered.

For the convenience of discussion, u is regarded as a potential interference node to v if u is located within the interference range of v[12], namely u neighbors v. Meanwhile, u is a real interference node to v if and only if the two nodes are neighbors and share the same channel with each other.

3 Traffic-Aware Channel Assignment Algorithm

3.1 Problem formulation

As we said before, $G=(V,E)$ is used to represent a multi-radio and multi-channel WMN in which every node is equipped with a certain number of radios. There are $|K|$ available orthogonal channels. Channel assignment should meet the requirements of network connectivity and the limitation of the number of radios. In other words, any active link in E is supposed to use one channel among $|K|$ available orthogonal channels. The number of channels occupied by one node has to be no more than the number of radios. In addition, the STC in Definition 2 should also be satisfied.

There are several channel assignment results which can meet the above three conditions in multi-radio multi-channel WMNs. The TASC algorithm assigns channels K to links E and the objective is to maximize the network capacity.

3.2 Channel assignment matrix model

In this section, the channel assignment model will be discussed.

Definition 3 An $|E|\times|K|$ matrix $\boldsymbol{A}^{\text{link}}$ is a channel assignment matrix which represents the channel assignment to links.

$$\boldsymbol{A}_{ij}^{\text{link}}=\begin{cases}1 & \text{channel } k_j \text{ to link } e_i\\ 0 & \text{otherwise}\end{cases}$$

As each link is composed of two nodes and the node-link relationship matrix is also given by network topology, the corresponding channel assignment matrix to the nodes is easily obtained from $\boldsymbol{A}^{\text{link}}$.

Definition 4 $\boldsymbol{S}$ is an $|E|\times|V|$ matrix which indicates the relationship between nodes and links.

$$\boldsymbol{S}_{ij}=\begin{cases}1 & \text{link } e_i \text{ is incident on node } v_j\\ 0 & \text{otherwise}\end{cases}$$

It is easily known that the sum of each row in matrix $\boldsymbol{S}$ equals two because each link consists of two nodes, namely,

$$\sum_{j=1}^{|V|} \boldsymbol{S}_{ij} = 2 \qquad 1 \leqslant i \leqslant |E|$$

Definition 5 A $|V| \times |K|$ matrix $\boldsymbol{A}^{\text{node}}$ is a channel assignment matrix which represents the channel assignment to nodes.

$$\boldsymbol{A}_{ij}^{\text{node}} = \begin{cases} 1 & \text{channl } k_j \text{ is assigned to node } v_i \\ 0 & \text{otherwise} \end{cases}$$

Note that one node may belong to more than one link. Hence, several channels may be assigned to one node.

Proposition 1 Through $\boldsymbol{A}^{\text{link}}$ and $\boldsymbol{S}$, we can obtain $\boldsymbol{A}^{\text{node}}$. If $\sum_{h=1}^{|E|} \boldsymbol{S}_{hi} \times \boldsymbol{A}_{hj}^{\text{link}} \geqslant 1$, $\boldsymbol{A}_{ij}^{\text{node}} = 1$, otherwise $\boldsymbol{A}_{ij}^{\text{node}} = 0$.

Proof 1) Sufficient condition If $\boldsymbol{A}_{ij}^{\text{node}} = 1$, there exists $\exists e_h \in E$ satisfying $\boldsymbol{S}_{hi} = 1$ and $\boldsymbol{A}_{hj}^{\text{link}} = 1$; namely, there is at least one link incident on node v_i and the link works on channel k_j. So we have $\sum_{h=1}^{|E|} \boldsymbol{S}_{hi}\boldsymbol{A}_{hj}^{\text{link}} \geqslant 1$.

2) Necessary condition If $\boldsymbol{A}_{ij}^{\text{node}} = 0$, there exists $\forall e_h \in E$ satisfying $\boldsymbol{S}_{hi} = 1$ and $\boldsymbol{A}_{hj}^{\text{link}} = 0$; namely, any link incident on node v_i does not occupy channel k_j. So we have $\sum_{h=1}^{|E|} \boldsymbol{S}_{hi} \times \boldsymbol{A}_{hj}^{\text{link}} = 0 < 1$.

Definition 6 A $|V| \times |V|$ matrix $\boldsymbol{P}^{\text{node}}$ represents potential interference nodes, namely neighbor matrix.

$$\boldsymbol{P}_{ij}^{\text{node}} = \begin{cases} 1 & v_i \text{ and } v_j \text{ are neighbors} \\ 0 & \text{otherwise} \end{cases}$$

When data are transmitted from node u to node v on channel k, we should know v's neighbors which work on channel k simultaneously. Thus, the real interference node matrix is defined.

Definition 7 The set of the real interference nodes of node v is defined as V'_{uv}, which interferes with the data transmission on link (u, v) using channel k_j.

$$V'_{uv} = \{v_i \in V \mid \boldsymbol{P}_{iv}^{\text{node}} = 1 \wedge \boldsymbol{A}_{ij}^{\text{node}} = 1\}$$

Definition 8 $\boldsymbol{L}$ is a $|V| \times |V|$ matrix and $\boldsymbol{L}(u, v)$ represents the signal level received by node v from u.

Obviously, each link should be assigned no more than one channel. Therefore, here comes the connectivity constraints. We assign no channel to a few links in order to avoid severe local interference, but our objective is to guarantee connectivity as far as possible.

$$\sum_{j=1}^{|K|} \boldsymbol{A}_{ij}^{\text{link}} \leqslant 1 \qquad 1 \leqslant i \leqslant |E|$$

Our second constraint is a radio constraint which assures the number of different channels assigned to any node is no more than the number of radios equipped in that node. According to $\boldsymbol{A}^{\text{node}}$ in Definition 5, we can formulate radio constraints. Suppose that v_i is equipped with R_i radios, the constraints can be expressed as

$$\sum_{j=1}^{|K|} \boldsymbol{A}_{ij}^{\text{node}} \leqslant R_i \qquad 1 \leqslant j \leqslant |K|$$

Our final constraint is the STC in Definition 2. A packet sent along link $e_i = (u, v)$ (in either direction) is correctly received if and only if

$$\text{SINR}_{uv} \geqslant \lambda_v, \ \text{SINR}_{vu} \geqslant \lambda_u \quad \forall e_i = (u, v) \in E; k_j \in K; \boldsymbol{A}_{ij}^{\text{link}} = 1$$

There are many feasible channel assignments to satisfy the above conditions. We select one of them according to our criteria. In this paper, our objective is to maximize the network capacity. Finally, with the above definitions and conditions, the static channel assignment model is proposed as follows:

$$\max \sum_{i=0}^{|V|} \boldsymbol{W}_i \lg\left(1 + \frac{\boldsymbol{L}(u, v)}{N_v + \sum_{x \in V'_{uv} - \{u\}} \boldsymbol{L}(x, v)}\right) \qquad (1)$$

$$\text{s. t.} \quad \sum_{j=1}^{|K|} \boldsymbol{A}_{ij}^{\text{link}} \leqslant 1 \qquad 1 \leqslant i \leqslant |E|$$

$$\sum_{j=1}^{|K|} \boldsymbol{A}_{ij}^{\text{node}} \leqslant R_i \qquad 1 \leqslant j \leqslant |K| \qquad (2)$$

$$\boldsymbol{A}_{ij}^{\text{link}} = 0 \text{ or } 1 \qquad 1 \leqslant i \leqslant |E|;\ 1 \leqslant j \leqslant |K|$$

$$\boldsymbol{A}_{ij}^{\text{node}} = \begin{cases} 1 & \sum_{k=1}^{|E|} \boldsymbol{S}_{ki}\boldsymbol{A}_{kj}^{\text{link}} \geqslant 1 \\ 0 & \sum_{k=1}^{|E|} \boldsymbol{S}_{ki}\boldsymbol{A}_{kj}^{\text{link}} = 0 \end{cases} \qquad (3)$$

$$\text{SINR}_{uv} \geqslant \lambda_v, \ \text{SINR}_{vu} \geqslant \lambda_u$$
$$\forall e_i = (u, v) \in E;\ k_j \in K;\ \boldsymbol{A}_{ij}^{\text{link}} = 1 \qquad (4)$$

Based on the above traffic-aware channel assignment model, the implementation of the TASC algorithm is discussed in next section.

3.3 Implementation of TASC algorithm

Algorithm 1 TASC

Input: V is a set of all nodes; E is a set of all links; K is a set of all channels; E' is a set of current links; K' is a set of current channels; $\boldsymbol{S}$ is a matrix indicating the relationship between nodes and links; λ is the minimum signal-to-interference-plus-noise ratio of each node; max is the current maximum of the objective value; $\boldsymbol{A}_{\max}$ is the channel assignment when the objective value is maximum; $\boldsymbol{A}_{\text{current}}$ is the current channel assignment matrix.

Output: $\boldsymbol{A}^{\text{link}}$ is the final channel assignment matrix.

```
//When all links are assigned channel
If (E' = = ∅)
    //If constraint conditions are satisfied, then the target value is calculated
    If (Eq. (2) = = TRUE && Eq. (3) = = TRUE && Eq. (4) = = TRUE)
    //Current maximum target value is larger than max, then update max and A_max
        If (MAX(Eq. (1)) > max)
            A_max = A_current; max = MAX(Eq. (1))
        End if;
    End if
End if
e = next link in E'
```

If ($K' == \varnothing$)

//Finish channel assignment on current link and start on next link.

Execute TASC(V, E, K, $E' - \{e\}$, K, $\boldsymbol{S}$, V, , max, $\boldsymbol{A}_{\max}$, $\boldsymbol{A}_{\text{current}}$);

Else

$K' = K$; //Reinitialize K'

For $k \in K$

//Assign channel k to link e

$\boldsymbol{A}_{\text{current}}(e, k) = 1$;

//Assign each available channel to current link

Execute TASC(V, E, K, E', $K' - \{k\}$, $\boldsymbol{S}$, V, max, $\boldsymbol{A}_{\max}$, $\boldsymbol{A}_{\text{current}}$);

End for

End if

The complexity of the TASC is $O(|V||K|^{|E|})$, which is acceptable since the algorithm is run on the isolated powerful server, and the result of the channel assignment is disseminated to every mesh node.

4 Simulation Results

In this section, we present the effect of the TASC on the capacity growth in WMNs for regular grid topologies and compare the results with another channel assignment solution (IQPSCA[9]) under the protocol interference model. In addition, the relationship between the radio number of nodes and the network capacity is also presented. We simulate a backbone network with a 3 × 3 grid topology in the experiments, which can be extended to more nodes easily.

Experiment 1 Comparison of maximum channel capacity

Fig. 1 shows the IQPSCA channel assignment in a 3 × 3 grid topology, in which each node is equipped with two radios and there are three available orthogonal channels. As seen in Fig. 1, links e_4, e_6, e_7 and e_9 interfer with each other. It seems that the four links increase the level of network connectivity. But in fact, the local severe collision deteriorates the overall communication and finally none of them can succeed in decoding signals. In Fig. 2, we present the channel assignment result of the TASC in the same grid topology under the physical interference model (Links to which channels are not assigned are eliminated). The links (v_4, v_5) and (v_5, v_6) are cut off, that is to say, both of them occupy no channel and traffic flows detour links (v_4, v_5) and (v_5, v_6). As a result, the interference to node v_5 is decreased greatly and the SINR value of v_5 increases. The aggregating capacity of Fig. 1 is 145.017 5 Mbit/s, while that of Fig. 2 is 198.328 1 Mbit/s. The aggregating capacity of WMNs is increased to 136.761 4% as a result of the lower interference.

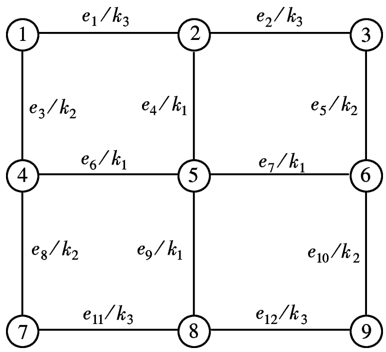

Fig. 1 IQPSCA result

In addition, in Fig. 3, we comparatively measure the maximum capacity of a 3 × 3 grid network topology, in which each mesh node is equipped with three radios.

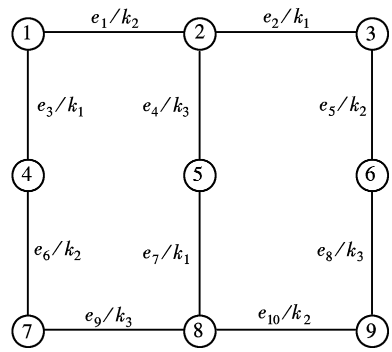

Fig. 2 TASC result

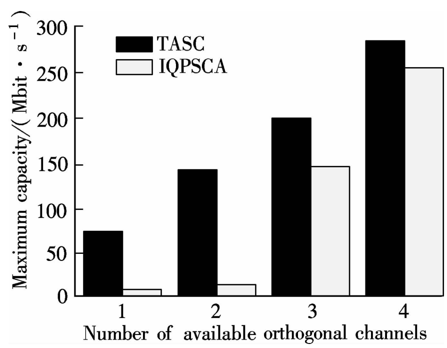

Fig. 3 The comparison of maximum network

The IQPSCA algorithm has a lower performance than the TASC when there are fewer available channels because its interference model underestimates accumulative interference. With the increase in available channels, the IQPSCA catches up with the TASC due to the decrease in accumulative interference.

Experiment 2 Study of the numbers of radios

The number of radios is another hot research point in multi-radio multi-channel WMNs. It seems better to provide as many radios for a node as possible to engage more orthogonal channels. However, it is not the truth. Too many radios may cause overuse of channels and interference will be increased. In fact, the number of radios is related to the number of orthogonal channels. For example, in Fig. 4, each node is equipped with three radios and there are five

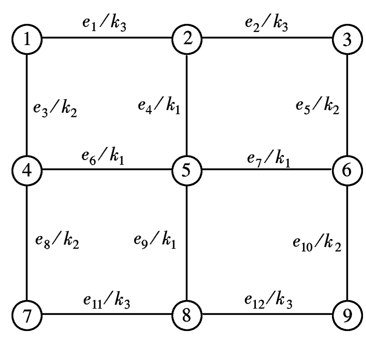

Fig. 4 TASC result with three radios

available orthogonal channels in the network. Only node v_4 and v_6 make full use of three radios and other nodes only use two radios. Therefore, we can see that it is enough that each node is equipped with three radios in this situation.

The maximum capacity vs. the number of radios is shown in Fig. 5. As $|K|=1$, one radio per node is sufficient. When $|K|=2,3,4$, two radios per node is enough. When $|K|=5,6,7$, three radios is needed for each node. And if $|K|=8$, each node needs to be equipped with four radios. Therefore, the waste of radio resources can be avoided by the TASC algorithm.

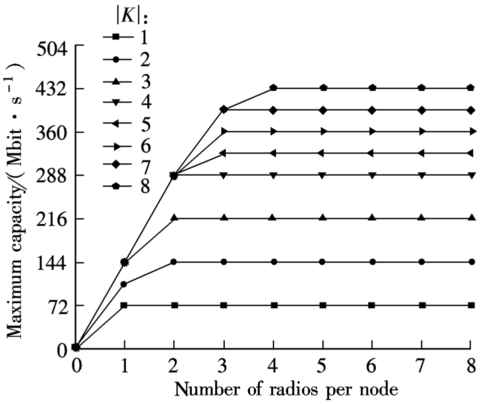

Fig. 5 Maximum capacity vs. radios number

5 Conclusion

In this paper, a static channel assignment algorithm for multi-radio multi-channel WMNs, which utilizes the integer linear plan method to improve network capacity, is proposed. Our simulation results show that the benefits obtained by considering the radio and connectivity constraints under the physical interference model are more practical and more realistic. In the future, we will concentrate on the reliable static channel assignment algorithm and the dynamic channel assignment algorithm.

References

[1] Wu H, Yang F, Tan K, et al. Distributed channel assignment and routing in multiradio multichannel multihop wireless networks [J]. *IEEE Journal on Selected Areas in Communications*, 2006, **24**(11): 1972 − 1983.

[2] Leung K K, Kim B J. Frequency assignment for multi-cell IEEE 802.11 wireless networks: European patent, EP1311087B1 [P]. 2008-06-25.

[3] Subramanian A P, Gupta H, Das S R, et al. Minimum interference channel assignment in multi-radio wireless mesh networks [J]. *IEEE Transactions on Mobile Computing*, 2008, **7**(12): 1459 − 1473.

[4] Alicherry M, Bhatia R, Li L E. Joint channel assignment and routing for throughput optimization in multiradio wireless mesh networks [J]. *IEEE Journal on Selected Areas in Communications*, 2006, **24**(11): 1960 − 1971.

[5] Garetto M, Salonidis T, Knightly E W. Modeling per-flow throughput and capturing starvation in CSMA multi-hop wireless networks [J]. *IEEE/ACM Transactions on Networking*, 2008, **16**(4): 864 − 877.

[6] Naveed A, Kanhere S S. Cluster-based channel assignment in multi-radio multi-channel wireless mesh networks [C]// *IEEE 34th Conference on Local Computer Networks*. Zurich, Switzerland, 2009: 53 − 60.

[7] Nasser N, Zeid M A. Integer linear optimization model for channel assignment problem in wireless mesh network [C]// *Wireless Communications and Mobile Computing Conference*. Crete Island, Greece, 2008: 854 − 858.

[8] Das A K, Alazemi H M K, Vijayakumar R, et al. Optimization models for fixed channel assignment in wireless mesh networks with multiple radios [C]//2005 *Second Annual IEEE Communications Society Conference on Sensor and Ad Hoc Communications and Networks*. Santa Clara, CA, USA, 2005: 463 − 474.

[9] Zhou B, Zhao Z, Huang A, et al. Optimization model for static channel assignment in multi-radio multi-channel wireless mesh networks [C]//*Wireless Communications & Signal Processing*. Nanjing, China, 2009: 1 − 5.

[10] Sridhar S, Guo J, Jha S. Channel assignment in multi-radio wireless mesh networks: a graph-theoretic approach [C]// *1st International Conference on Communication Systems and Networks and Workshops*. Bangalore, India, 2009: 1 − 10.

[11] Gupta P, Kumar P R. The capacity of wireless networks [J]. *IEEE Transactions on Information Theory*, 2000, **26**(2): 388 − 404.

[12] Cheng H, Chen G, Xiong N, et al. Static channel assignment algorithm in multi-channel wireless mesh networks [C]//*International Conference on Cyber-Enabled Distributed Computing and Knowledge Discovery*. Zhangjiajie, China, 2009: 49 − 55.

无线 Mesh 网中流量感知的静态信道分配算法

陶 军 柳 津 邵碧锐 刘智杰

(东南大学教育部计算机网络和信息集成重点实验室,南京 210096)
(东南大学计算机科学与工程学院,南京 210096)

摘要:在多射频多信道无线 Mesh 网中提出了一种支持流量感知的信道分配算法. 首先,介绍了基于信号与干扰噪声比和成功传输条件的物理干扰模型,该模型比其他模型更适用于无线传输环境. 然后,使用纯整数线性规划方法来解决信道分配问题,提高无线 Mesh 网网络容量. 在考虑网络连通性要求,射频数量限制和无线通信中成功传输条件等网络参数的基础上,设计了 TASC 信道分配算法. TASC 算法在保证网络连通的同时降低了网络干扰,提高了信道分配效率. 最后,仿真实验结果表明了该算法在容量优化方面的可行性和高效性. 与同类算法比较,该算法能有效提高无线 Mesh 网网络容量.

关键词:多射频多信道无线 Mesh 网;静态信道分配;流量感知
中图分类号:TP393