2013年度

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춘계학술대회

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- 장소 : 동신대학교 첨단강의동
- 주관 : KICS 한국통신학회
  한러MT-IT융합기술연구센터
- 주최 : 한국통신학회 광주전남지부
- 후원 : ETRI 호남권연구센터, 한국방송통신전파진흥원 전남본부,
  한국정보통신공사협회 광주전남도회, LG유플러스,
  KT전남고객본부, 대한정보통신(주), (주)유비이테크,
  (주)엠시스템즈, (주)티디엘, (주)국민통신

안 내

발표장소 : 동신대학교 첨단강의동

구 분	세 션	좌 장	발 표 장
제 1 발표장	통신 및 보안	황인태(전남대) 한승조(조선대)	201호
제 2 발표장	임베디드응용기술	지유강(동신대) 조병록(순천대)	202호
제 3 발표장	정보기술 및 USN	변재영(조선대) 김대진(전남대)	203호
제 4 발표장	광통신 및 멀티미디어기술	조두산(순천대) 김철원(호남대)	206호

Oral Session

발 표 장 소 : 201호

1. 통신 및 보안

15:00-18:00

좌장 : 황인태(전남대), 한승조(조선대)

[1-1] LTE-A 시스템에서 스케줄링 및 프리코딩을 결합한 CoMP 기술의 성능 분석
..... 김보라, 문상미, 사란쉬 말리크, 황인태(전남대학교)

[1-2] LTE-A에서 릴레이 프로토콜을 위한 다중 사용자 MIMO 기반 Joint Precoding 최적화 알고리즘
..... 사란쉬 말리크, 문상미, 김보라, 황인태(전남대학교)

[1-3] 이종 네트워크에서 자원 할당 기반 간섭 관리 기법의 성능 분석
..... 문상미, 김보라, 사란쉬 말리크, 황인태(전남대학교)

[1-4] Wireless LAN에서 암호화 WEP(Wired Equivalent Privacy)와 전송성능에 관한 연구
..... 황성규, 구현실, 한승조*(조선대학교, 한국폴리텍대학, *조선대학교)

[1-5] 바이오 보안토큰과 공인인증서 연계모델에 관한 연구
..... 최서홍, 류갑상(동신대학교)

[1-6] 지리적 장애하의 오버레이 네트워크 평가를 위한 에뮬레이션 플랫폼 구현
..... 김경백(전남대학교)

[1-7] 계층 구조를 갖는 에너지 효율적인 수중 무선 센서 네트워크 라우팅 기법
..... 이새움, *김기성, 김기선(광주과학기술원 *국방과학기술연구소)

[1-8] On Correlation Separability of Mobile-to-Mobile MIMO Fading Channels
Yoo Sang Jo, Jung Hyo Young, Kim Ki Seon(Gwangju Institude of Science and Technology (GIST))

On Correlation Separability of Mobile-to-Mobile MIMO Fading Channels

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Abstract

In this work, the correlation separability assumption widely used in the literature is defined in a mathematical form for mobile-to-mobile (M2M) multiple-input multiple-output (MIMO) channels, and we verify that such assumption does not hold in general frequency selective channels.

I. Problem Formulation

In the literature, it is often assumed that a space-time-frequency correlation function (STF-CF) is separable in order to obtain mathematical tractability for ease of system performance analysis and channel simulation with low-complexity [1]. In this paper, we analyze how such separability assumption impact on the STF correlation properties of M2M MIMO channel environment by mathematically defining the separability based on the WSSUS framework [2] with a geometry-based stochastic channel model (GBSCM) which is useful for channel correlation analysis.

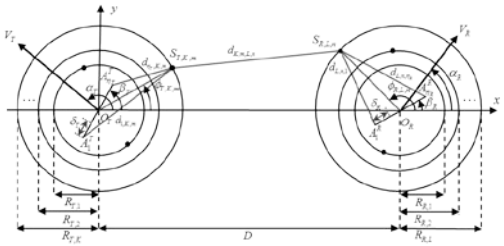

Fig. 1. GBSCM for M2M wideband MIMO channels

II. Solution Approach

Correlation separability is in general defined to denote that the joint pdf of stochastic channel w.r.t antenna spacings, Doppler shifts, and propagation delays are statistically uncorrelated in wide-sense such that the STF-CF is expressed by multiplication of sub-correlation functions. In this paper, we consider the correlation separability between propagation delays and Doppler shifts for the page limitation. The STF-CF of the GBSCM in Fig. 1 is defined as

$$\tilde{r}_{H_{pq}H_{p'q'}}(\delta_T,\delta_R,\Delta t,\Delta f)=E\left[H_{pq}(t_2,f_2)H_{p'q'}^{*}(t_1,f_1)\right]. \quad (1)$$

One typical way to obtain delay-Doppler separability is to assume that scatterers placed on the same ring cause equal propagation delay. In this case, (1) becomes

$$\tilde{r}_{H_{pq}H_{p'q'}}(\delta_T,\delta_R,\Delta t,\Delta f)=\tilde{r}_{H_{pq}H_{p'q'}}(\delta_T,\delta_R,\Delta t)\cdot\tilde{r}_{H_{pq}H_{p'q'}}(\Delta f). \quad (2)$$

III. Conclusive Remarks

In this work, we analytically derived Eq. (1) and (2), and the results are visualized as below:

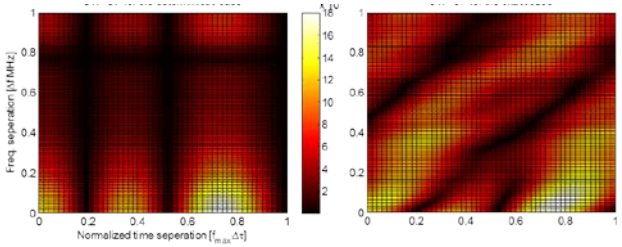

Fig. 2. STF-CF comparison when root-mean square delay spread (RMS-DS) is $0.977\mu s$ (left: Eq. (2); right Eq. (1)):

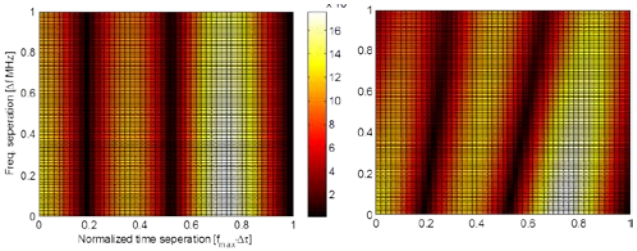

Fig. 3. STF-CF comparison when RMS-DS is $0.0977\mu s$. (left: Eq. (2); right Eq. (1))

Fig. 2 and 3 indicate that the channel model with the delay-Doppler separability causes significant STF-CF errors while the error becomes smaller as the RMS-DS value gets smaller. This implies two things: the linearity of statistical dependency between delay and Doppler spread depends on channel RMS-DS; the separability assumption is not valid as long as channel delay spread exists.

ACKNOWLEDGMENT

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Reference

[1] C.-S. Lin et al., "Performance Evaluations of Channel Estimation in IEEE 802.11p environments," Wksp. Mobile Computing and Networking Tech. 2009, (WMCNT'09).

[2] G. Matz, "Characterization and analysis of doubly dispersive MIMO channels," in Asilomar Conference on Signals, Systems and Computers, Pacific Grove, CA, USA, Oct./Nov. 2006, pp. 946–950.