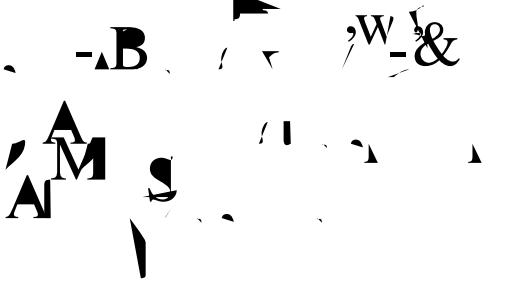
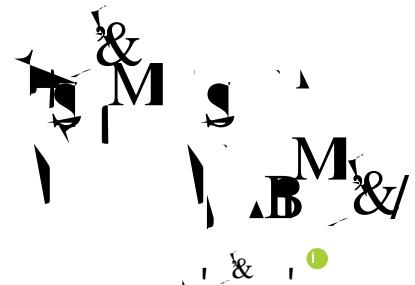


A



Signal distortion category:

Probabilistic category: **A**

M A 2 2 & A 2 2
M A 2 2 & A 2 2
M A 2 2 & A 2 2

Hybrid category:

W A W k H w M & A

W M & A B & C D E F G H I J K L M N O P Q R S T U V W X Y Z

W M & B & W W W W W W W W

& ^w M & ^w 2.

A & **B** & **C** & **D** & **E** & **F** & **G** & **H** & **I** & **J** & **K** & **L** & **M**

A & **B** & **C** & **D** & **E** & **F** & **G** & **H** & **I** & **J** & **K** & **L** & **M** & **N** & **O** & **P** & **Q** & **R** & **S** & **T** & **U** & **V** & **W**

M & **P** **M** & **W**

W
H
A
R
T
M
U
L
A
N
D
S
P
R
I
G
E
R
Y
M
A
N
A
N
D
C
O
R
P
S
W
H
A
R
T
M
U
L
A
N
D
S
P
R
I
G
E
R
Y
M
A
N
A
N
D
C
O
R
P
S

• B & M & M A

A & **B** **M** & **M**

W
M & A S W k A S

W

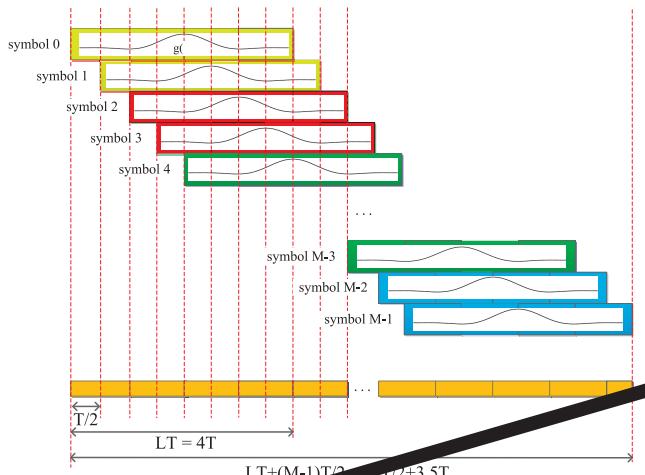
Notations:

$$\mathbb{C}^{m \times n}, \mathbf{x} \in \mathbb{C}^m, \mathbf{w} \in \mathbb{C}^n, \mathbf{y} = \mathbf{w}^\top \mathbf{x}, \mathbf{y} \in \mathbb{C}^1, \mathbf{y} = \mathbf{w}^\top \mathbf{x} = \mathbf{w}_1 x_1 + \dots + \mathbf{w}_m x_m, \mathbf{y} = \mathbf{w}^\top \mathbf{x} = \sum_{i=1}^m w_i x_i, \mathbf{y} = \mathbf{w}^\top \mathbf{x} = \mathbf{w} \odot \mathbf{x}, \mathbf{y} = \mathbf{w}^\top \mathbf{x} = \mathbf{w} \otimes \mathbf{x},$$

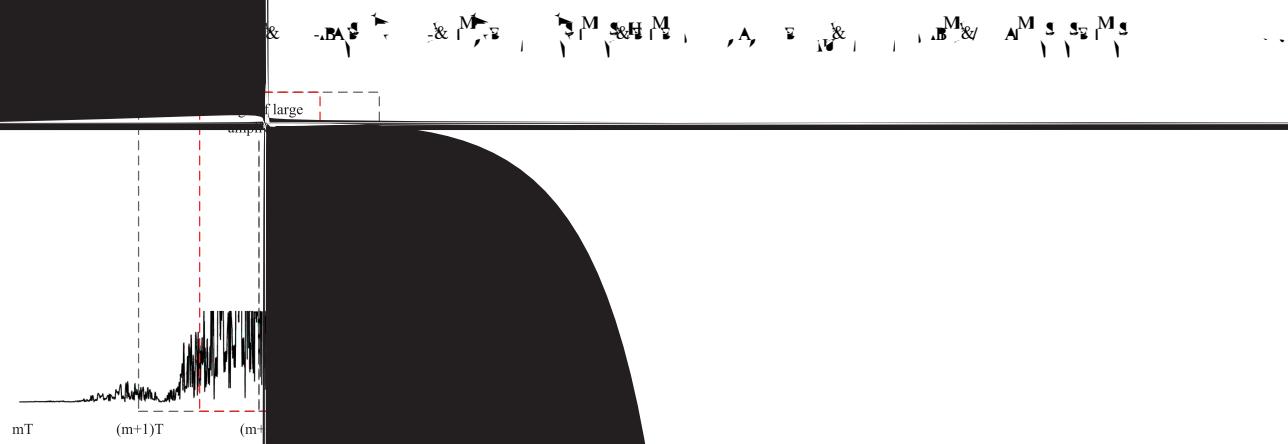
A. Expressing an FBMC/OQAM Signal With an Overlapping Structure

$$\begin{aligned} \mathbf{d}^0, \mathbf{d}^1, \mathbf{d}^{\frac{M}{2}-1} &\in \mathbb{R}^{N \times \frac{M}{2}}, \\ \mathbf{d}^m &= d_0^m \ d_1^m \ \dots \ d_{N-1}^m \ ^T \ 1 \cdot d_n^m, \\ d_n^m &= a_n^m + jb_n^m, \\ \tilde{\mathbf{D}} &\in \mathbb{R}^{N \times M}, \end{aligned}$$

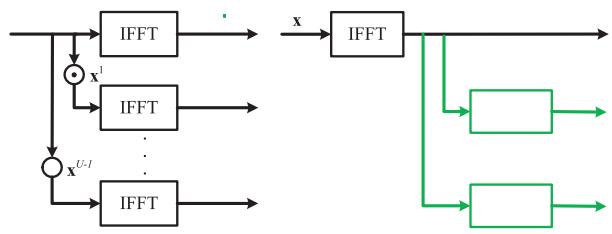
$$s(t) = \sum_{m=0}^{M-1} \sum_{n=0}^{N-1} d_n^m \underbrace{e^{j\frac{2\pi}{T}m+n}}_{g_{m,n}(t)} e^{j2\pi nt} g\left(t - m\frac{T}{2}\right) \quad (2)$$



$\frac{g}{w} m n t$ $L_g = LN$,
 $\frac{g}{w} t$ L_g N ,
 L_g N ,
 $M & M$ L_g N ,
 $M & M$ L_g N ,
 $L + M - 1 \frac{T}{2} = L + \frac{M}{2} - \frac{1}{2} T$,
 $M & M$ L_g N ,
 $H A S$ $H A S$,
 $M & M$ L_g N ,
 $M & M$ L_g N ,
 $M & M$ L_g N ,
 $w M$ T , $M & M$ L_g N ,
 $w M$ T , $M & M$ L_g N ,
 $w M$ T , $M & M$ L_g N ,



תְּהִלָּה



$$\mathbf{C}^3 = 0.5 \times \left(\begin{array}{cccccccccccccccc} 1 & 0 & 0 & 0 & j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & -j & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & -j & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & -j & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & -j \\ -j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & j & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & -j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & j & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & -j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & j & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & j & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & -j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & j & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & -j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & j & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & -j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & j & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & -j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & j \\ j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & -j & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & -j & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & -j & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & j & 0 & 0 & 0 & 1 & 0 & 0 & 0 & -j & 0 & 0 & 0 & 1 \end{array} \right) \quad (14)$$

Figure 1 shows the effect of the number of hidden neurons on the performance of the proposed model.

A & B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Index	Phase rotation vector tuple	Conversion vector tuple
1	$\tilde{\mathbf{p}}^1 = [1 \ 1 \ 1 \ 1]$	$\tilde{\mathbf{c}}^1 = [1 \ 0 \ 0 \ 0]$
2	$\tilde{\mathbf{p}}^2 = [-1 \ 1 \ 1 \ 1]$	$\tilde{\mathbf{c}}^2 = [1 \ -1 \ -1 \ -1]$
3	$\tilde{\mathbf{p}}^3 = [1 \ -1 \ 1 \ 1]$	$\tilde{\mathbf{c}}^3 = [1 \ -j \ j \ j]$
4	$\tilde{\mathbf{p}}^4$	

$$\mathbf{C}^u = \mathbf{C}^u + \mathbf{A}_u \mathbf{A}_u^T \quad (17)$$

$$\mathbf{p}^u = \left[\underbrace{(\tilde{\mathbf{p}}^u)^T (\tilde{\mathbf{p}}^u)^T}_{ON} (\tilde{\mathbf{p}}^u)^T \right]^T \in \mathbb{C}^{1 \times U} \quad (18)$$

$$\mathbf{c}^u = \{\mathbf{p}^u\} \in \mathbb{C}^{1 \times U} \quad (19)$$

$$\mathbf{C}^u = [\mathbf{c}^u^{(0)} \ \mathbf{c}^u^{(1)} \ \dots \ \mathbf{c}^u^{(ON-1)}] \in \mathbb{C}^{1 \times ON} \quad (20)$$

$$\text{if } u \in \{1, 2, \dots, U\}, \text{ then } \tilde{\mathbf{p}}^u = \mathbf{1}, \text{ else } \tilde{\mathbf{p}}^u = \mathbf{0}$$

2) *Conversion Vector-Based Modulation:*

$$\begin{aligned} \mathbf{x} &= \begin{bmatrix} x_1 & x_2 & \dots & x_{\frac{N}{2}} & 0 & 0 & \dots & 0 & 0 & x_{\frac{N}{2}+1} \\ x_{\frac{N}{2}+2} & x_N & \dots & x_{\frac{N}{2}} & k_1 & k_2 & \dots & k_{U-1} & k_U & s^1 \end{bmatrix}^T \in \mathbb{C}^{1 \times N} \\ \mathbf{s}^u &= \mathbf{C}^u \cdot \mathbf{x} \in \mathbb{C}^{1 \times U} \quad u = 2, \dots, U \quad (21) \end{aligned}$$

$$\mathbf{s}_L = \mathbf{s}^u L \in \mathbb{C}^{1 \times M}, \quad \mathbf{M} \in \mathbb{C}^{M \times U}$$

$$\mathbf{s}_L^u = \left[\underbrace{(\mathbf{s}^u)^T (\mathbf{s}^u)^T}_{ON} (\mathbf{s}^u)^T \right]^T \in \mathbb{R}^{1 \times U} \quad (22)$$

$$\mathbf{s}_m^u = \mathbf{s}_L^u \cdot g \in \mathbb{R}^{1 \times U} \quad (23)$$

$$\mathbf{s}^u_t = \underbrace{\sum_{m'=1}^{m-1} \mathbf{s}_{m'}^{u_{min}^{m'}}}_{\text{PAPR reduction}} + \underbrace{\mathbf{s}_m^u}_{\text{PAPR target}} \quad (24)$$

$$\text{if } m' \in \{1, 2, \dots, M-1\}, \text{ then } \mathbf{s}_{m'}^{u_{min}^{m'}} = \mathbf{0}, \text{ else } \mathbf{s}_{m'}^{u_{min}^{m'}} = \mathbf{1}$$

3) *PAPR Calculation:*

$$\text{PAPR}_{T_0}^u = \frac{\int_{T_0}^{t=T_0} |\mathbf{s}^u_t|^2 dt}{\int_{T_0}^{t=T_0} |\mathbf{s}^u_t|^2 dt} \quad u \in \{1, 2, \dots, U\} \quad (25)$$

$$\text{if } t = T_0, \text{ then } \mathbf{s}^u_t = \mathbf{0}, \text{ else } \mathbf{s}^u_t = \mathbf{1}$$

$$\text{PAPR}_{T_0}^u = \frac{\int_{T_0}^{t=T_0} |\mathbf{s}^u_t|^2 dt}{\int_{T_0}^{t=T_0} |\mathbf{s}^u_t|^2 dt} \quad u \in \{1, 2, \dots, U\} \quad (25)$$

$$\text{if } t = T_0, \text{ then } \mathbf{s}^u_t = \mathbf{0}, \text{ else } \mathbf{s}^u_t = \mathbf{1}$$

$$\text{if } t = T_0, \text{ then } \mathbf{s}^u_t = \mathbf{0}, \text{ else } \mathbf{s}^u_t = \mathbf{1}$$

$$\text{if } t = T_0, \text{ then } \mathbf{s}^u_t = \mathbf{0}, \text{ else } \mathbf{s}^u_t = \mathbf{1}$$

$$\text{if } t = T_0, \text{ then } \mathbf{s}^u_t = \mathbf{0}, \text{ else } \mathbf{s}^u_t = \mathbf{1}$$

$$\text{if } t = T_0, \text{ then } \mathbf{s}^u_t = \mathbf{0}, \text{ else } \mathbf{s}^u_t = \mathbf{1}$$

$$\text{if } t = T_0, \text{ then } \mathbf{s}^u_t = \mathbf{0}, \text{ else } \mathbf{s}^u_t = \mathbf{1}$$

$$\text{if } t = T_0, \text{ then } \mathbf{s}^u_t = \mathbf{0}, \text{ else } \mathbf{s}^u_t = \mathbf{1}$$

$$\text{if } t = T_0, \text{ then } \mathbf{s}^u_t = \mathbf{0}, \text{ else } \mathbf{s}^u_t = \mathbf{1}$$

$$\text{if } t = T_0, \text{ then } \mathbf{s}^u_t = \mathbf{0}, \text{ else } \mathbf{s}^u_t = \mathbf{1}$$

	Number of Multiplications	Number of Additions
DSLM scheme	$UM \frac{ON}{2} \log_2(ON)$	$UMON \log_2(ON)$
C-DSLM scheme	$M \frac{ON}{2} \log_2(ON)$	$MON \log_2(ON) + 3(U-1)MON$

$$\mathbf{s}^u_t = \mathbf{s}_m^u \cdot \mathbf{g} \in \mathbb{R}^{1 \times U} \quad u = 2, \dots, U \quad (26)$$

$$\mathbf{s}^u_t = \mathbf{s}_m^u \cdot \mathbf{g} \in \mathbb{R}^{1 \times U} \quad u = 2, \dots, U \quad (26)$$

$$\mathbf{s}^u_t = \mathbf{s}_m^u \cdot \mathbf{g} \in \mathbb{R}^{1 \times U} \quad u = 2, \dots, U \quad (26)$$

C. Complexity Evaluation

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

$$\text{Complexity Reduction} = \left(1 - \frac{\text{DSLM complexity}}{\text{C-DSLM complexity}} \right) \times 100\% \quad (27)$$

& H. C. et al. | $\mathbf{A} \leftarrow \mathbf{B} - \mathbf{C}$ & $\mathbf{M} \leftarrow \mathbf{M} + \mathbf{C}$, $\mathbf{A}, \mathbf{B}, \mathbf{C} \in \mathbb{R}^{M \times M}$, $M = 100, N = 1, U = 1$

	$U = 4$		$U = 8$		$U = 16$	
	Number of Multiplications	Number of Additions	Number of Multiplications	Number of Additions	Number of Multiplications	Number of Additions
DSLM scheme	409600	819200	819200	1638400	1638400	3276800
C-DSLM scheme						



- 1 A&K, H, B, M, IEEE J. Sel. Areas Commun., 2011, 29(1), 1–12.

2 A&K, H, B, M, IEEE Internet Things J., 2011, 1(1), 1–10.

3 A&K, H, B, M, IEEE Trans. Veh. Technol., 2011, 60(1), 40–46.

4 A&K, H, B, M, IEEE Trans. Broadcast., 2011, 57(1), 1–12.

5 A&K, H, B, M, IEEE Trans. Broadcast., 2011, 57(1), 1–12.

6 A&K, H, B, M, IEEE Trans. Broadcast., 2011, 57(1), 1–12.

7 A&K, H, B, M, IEEE Trans. Broadcast., 2011, 57(1), 1–12.

8 A&K, H, B, M, IEEE Trans. Broadcast., 2011, 57(1), 1–12.

9 A&K, H, B, M, IEEE Trans. Broadcast., 2011, 57(1), 1–12.

10 A&K, H, B, M, IEEE Trans. Broadcast., 2011, 57(1), 1–12.

11 A&K, H, B, M, IEEE Wireless Commun. Lett., 2011, 1(1), 1–1.

12 A&K, H, B, M, IEEE Access, 2011, 1(1), 1–1.

1 A&K, H, B, M, Proc. IEEE Workshop Signal Process. Adv. Wireless Commun. (SPAWC), 2009, 1(1), 1–1.

2 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

3 A&K, H, B, M, IEEE Commun. Surveys Tuts., 2009, 11(1), 24–44.

4 A&K, H, B, M, IEEE Commun. Lett., 2009, 12(1), 1–1.

5 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

6 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

7 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

8 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

9 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

10 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

11 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

12 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

1 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

2 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

3 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

4 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

5 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

6 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

7 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

8 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

9 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

10 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

11 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

12 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

1 A&K, H, B, M, Electron. Lett., 2009, 45(22), 1200–1201.

2 A&K, H, B, M, Electron. Lett., 2009, 45(22), 1200–1201.

3 A&K, H, B, M, J. Comput. Netw. Commun., 2009, 2010(1), 1–12.

4 A&K, H, B, M, Proc. Int. Conf. Comput. Netw. Commun. (ICNC), 2009, 1(1), 1–12.

5 A&K, H, B, M, IEEE Trans. Signal Process., 2009, 57(10), 3710–3711.

6 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

7 A&K, H, B, M, Proc. 19th Int. Conf. Adv. Commun. Technol. (ICACT), 2009, 1(1), 1–12.

8 A&K, H, B, M, IEEE Commun. Lett., 2009, 13(11), 222–223.

9 A&K, H, B, M, Proc. IEEE Veh. Technol. Conf. (VTC), 2009, 2010(1), 1–12.

10 A&K, H, B, M, IEEE Trans. Veh. Technol., 2009, 58(1), 20–24.

11 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

12 A&K, H, B, M, Proc. IEEE Int. Commun. Conf. (ICC), 2009, 1(1), 1–12.

1 A&K, H, B, M, EURASIP J. Adv. Signal Process., 2009, 2010(1), 1–12.

2 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

3 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

4 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

5 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

6 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

7 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

8 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

9 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

10 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

11 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

12 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

1 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

2 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

3 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

4 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

5 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

6 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

7 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

8 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

9 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

10 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

11 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

12 A&K, H, B, M, IEEE Access, 2009, 1(10), 1–1.

1 A&K, H, B, M, Circuits Syst. Signal Process., 2009, 28(4), 1–12.

2 A&K, H, B, M, IET Commun., 2009, 3(12), 1–12.

3 A&K, H, B, M, IEEE Trans. Broadcast., 2009, 55(1), 1–12.

4 A&K, H, B, M, Wireless Pers. Commun., 2009, 50(100), 1–11.

5 A&K, H, B, M, IEEE Trans. Veh. Technol., 2009, 58(10), 20–24.

6 A&K, H, B, M, Proc. IEEE Int. Conf. Acoust. Speech Signal Process. (ICASSP), 2009, 2010(1), 1–12.

44. A. H. & M. S., "A. H. & M. S.", IEEE Trans. Veh. Technol., 1, 2012.

45. A. H. & M. S., "A. H. & M. S.", IEEE Commun. Lett., 12, 2012.

46. A. H. & M. S., "A. H. & M. S.", Proc. IEEE GLOBECOM, 2000.

47. A. H. & M. S., "A. H. & M. S.", IEEE Trans. Signal Process., 12, 24, 2000.