UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.
Petitioner

v.

BELL NORTHERN RESEARCH, LLC
Patent Owner

Patent No. 8,416,862

DECLARATION OF DR. LEONARD J. CIMINI
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 8,416,862

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A. *Maltsev*, *Haykin*, and *Sadrabadi* Disclose or Suggest the Features of Claims 9, 11, and 12 79

1. Claim 9 79

a) 9[a] A wireless communication device comprising: 79

b) 9[b] a plurality of Radio Frequency (RF) components operable to receive an RF signal and to convert the RF signal to a baseband signal; and 82

c) 9[c] a baseband processing module operable to: 96

d) 9[d] receive a preamble sequence carried by the baseband signal; 104

e) 9[e] estimate a channel response based upon the preamble sequence; 114

f) 9[f] determine an estimated transmitter beamforming unitary matrix (V) based upon the channel response and a receiver beamforming unitary matrix (U); 124

g) 9[g] decompose the estimated transmitter beamforming unitary matrix (V) to produce the transmitter beamforming information; and 143

h) 9[h] form a baseband signal employed by the plurality of RF components to wirelessly send the transmitter beamforming information to the transmitting wireless device. 159

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2. Claim 11 167

a) "The wireless communication device of claim 9, wherein the channel response (H), estimated transmitter beamforming unitary matrix (V), and the receiver beamforming unitary matrix (U) are related by the equation: *H=UDV where, D is a diagonal matrix."** 167

3. Claim 12 171

a) "The wireless communication device of claim 9, wherein in determining the estimated transmitter beamforming unitary matrix (V) based upon the channel response and the receiver beamforming unitary matrix (U), the baseband processing module performs Singular Value Decomposition (SVD) operations." 171

B. *Maltsev*, *Haykin*, *Sadrabadi*, and *Yang* Disclose or Suggest the Features of Claim 10 173

1. Claim 10 173

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a) **"The wireless communication device of claim 9, wherein in determining an estimated transmitter beamforming unitary matrix (V) based upon the channel response and a receiver beamforming unitary matrix (U), the baseband processing module is operable to: produce the estimated transmitter beamforming unitary matrix (V) in Cartesian coordinates; and convert the estimated transmitter beamforming unitary matrix (V) to polar coordinates."** 173

X. CONCLUSION.....179

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