

EXHIBIT B-1

Invalidity of U.S. Patent No. 8,078,561 by “Deembedding Static Nonlinearities and Accurately Identifying and Modeling Memory Effects in Wide-Band RF Transmitters to Liu, et al. (“Liu”)

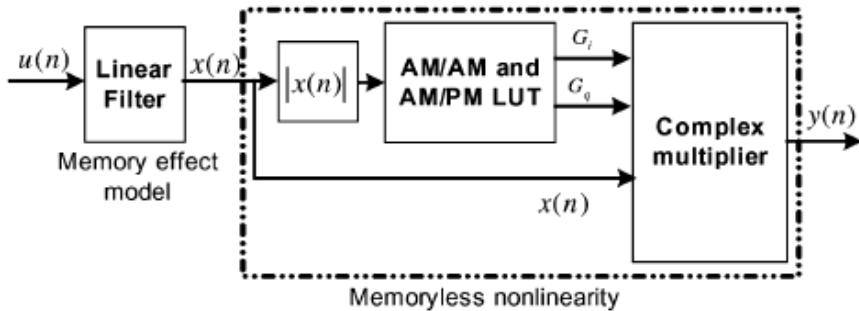
The Asserted Claims of U.S. Pat. No. 8,078,561 (“the ’561 Patent”) are anticipated and/or rendered obvious in view of “Deembedding Static Nonlinearities and Accurately Identifying and Modeling Memory Effects in Wide-Band RF Transmitters (“Liu”) alone or in combination with other prior art. Liu is an article published by IEEE Transactions on Microwave Theory and Techniques, Vol. 53, No. 11 on November 7, 2005. Liu, thus, is prior art to the ’561 Patent at least under §§ 102(a), 102(b), and/or 102(e).

As described in detail below, Liu anticipates Asserted Claims 1–22 of the ’561 Patent. In addition, to the extent that Smart RF asserts that Liu or citations below are insufficient, every limitation set forth in the claim was predictable and obvious in view of the knowledge and progression of the art. As such, it would have been obvious to one of ordinary skill in the art at the time of the alleged invention, based on the explicit and implicit teaching of this reference and the prior art, the knowledge of one of ordinary skill in the art, and/or the nature of the claimed invention and the problem(s) purportedly being solved to take the purportedly missing element from the art and combine it with the other elements in prior art identified in the cover pleading or herein.

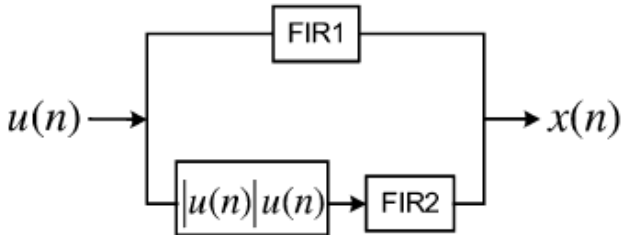
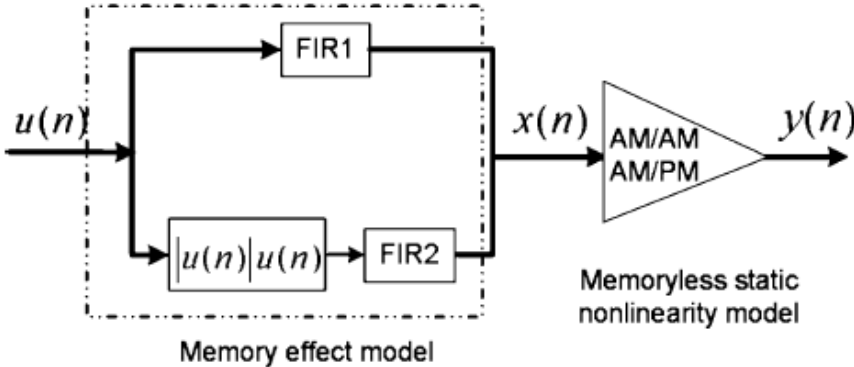
This claim chart is based on Defendants’ present understanding of the asserted claims, Smart RF’s vague and overbroad infringement contentions (and corresponding, implicit claim constructions), and Defendants’ investigations to date. Defendants are not adopting Smart RF’s apparent constructions, nor are Defendants admitting to the accuracy of any particular construction. Defendants reserve all rights to amend this invalidity claim chart in light of any claim-construction developments or any amendment to Smart RF’s infringement contentions. Further, as discovery is ongoing and Defendants continue to seek discovery from third parties regarding the references identified in Defendants’ invalidity contentions as well as other potential prior art, Defendants reserve the right to amend or supplement this claim chart identified in connection with Defendants’ continuing investigation. At minimum, Defendants intend to revise their invalidity contentions as appropriate to include discovery from third parties as discovery progresses. The claim chart below identifies where each limitation of the asserted claims of the ’561 Patent can be found in Liu. The citations provided below are exemplary, rather than exhaustive, and Defendants reserve the right to rely upon any other portion of the cited references.

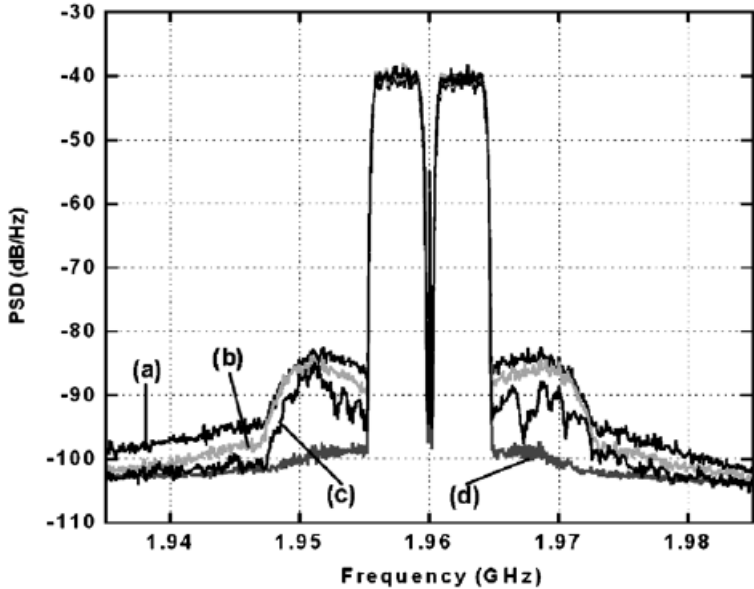
Claim No.	’561 Patent	Exemplary Evidence of Anticipation and/or Obviousness
1[pre]	A behavioral model of a nonlinear dynamic system, the model comprising:	To the extent the preamble is limiting, Liu discloses and/or renders obvious a behavioral model of a nonlinear dynamic system. <i>See, e.g.:</i> In this paper, a robust modeling technique for memoryless wide-band radio frequency transmitters using a dynamic exponential weighted moving average algorithm is developed

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		and tested. To improve the relatively limited accuracy of the conventional Wiener model in predicting the response of dynamic nonlinear transmitters, a new augmented Wiener model is proposed along with its parameter-identification procedure. The accuracy of the augmented Wiener model is compared with that of the conventional Wiener model by using an -band 60-W peak-envelope-power GaAs field-effect-transistor push-pull amplifier-based transmitter, which is driven by a two-carrier wide-band code-division multiple-access signal. (Liu, at Abstract.) In Section VI, a new comprehensive memory-effect model is proposed. This model is able to account for linear distortion (frequency response near the carrier) and weak nonlinear distortion due to baseband frequency response, harmonic loading conditions, and trap effects that might occur in semiconductor devices. Based on this new memory-effect model, an augmented Wiener model is established and found to be much more accurate than the conventional Wiener model in predicting ACPR levels of a wide-band 60-W peak-envelope-power (PEP) GaAs field-effect-transistor (FET) push-pull amplifier-based transmitter driven by multicarrier wide-band code-division multiple-access (WCDMA) signals. (Liu, at 3579.)

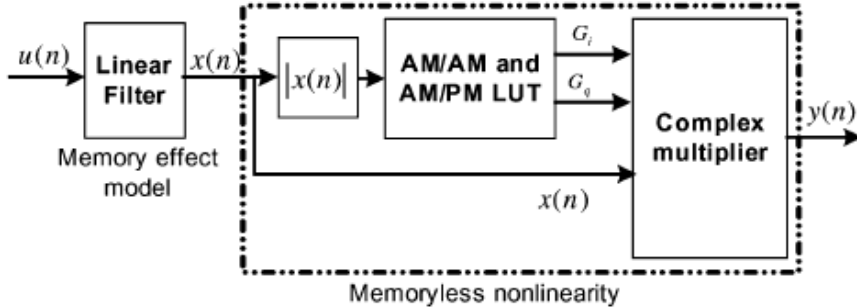
Claim No.	'561 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		 Fig. 3. Wiener transmitter model diagram from [8]. (Liu, at Fig. 3.) A Wiener nonlinear model, shown in Fig. 3, consisting of a dynamic linear filter followed by a static nonlinear block, is adopted to construct a behavioral model of a wide-band RF transmitter. The static nonlinearity can be characterized by the lookup tables based on the AM/AM and AM/PM curves of the transmitter. These curves can be extracted directly from the baseband measurement data by means of a moving average procedure, as explained below. (Liu, at 3580.) The linear FIR filter in the Wiener model, as previously presented, takes into account the frequency response around the carrier frequency (linear distortion) and not the nonlinear even-order distortion sources. In fact, the extracted AM/AM and AM/PM characteristics of the dynamic memory-effect model, as shown in Figs. 6 and 7, are not completely symmetric around the X-axis. This suggests that weak nonlinearities still exist even after deembedding static and strong nonlinearity from the measured data. For this reason, it is not sufficient to model these weak nonlinearities with a linear filter, as is normally done in conventional

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		Wiener models. This also explains the relatively limited capability of the conventional Wiener model to predict the response of the transmitter. [] In this paper, a new comprehensive memory-effect model is proposed. As shown in Fig. 16, one can see that a new parallel branch is added to the linear FIR filter. In this new parallel branch, the input signal $u(n)$ is multiplied by its magnitude $u(n)$ and applied to another FIR filter. In this way, the linear FIR filter in the conventional Wiener model, as described in Section V, is replaced by a weak nonlinear dynamic FIR-based filter. The second-order terms are introduced to the dynamic memory-effect model in such a way as to make it able to mimic memory effects more accurately. (Liu, at 3584–85.)

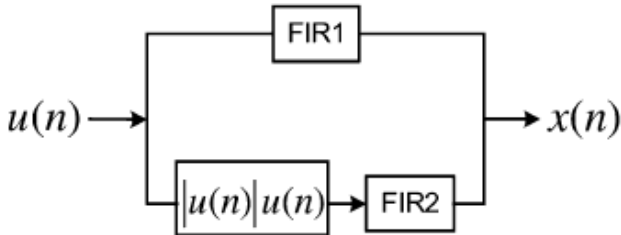
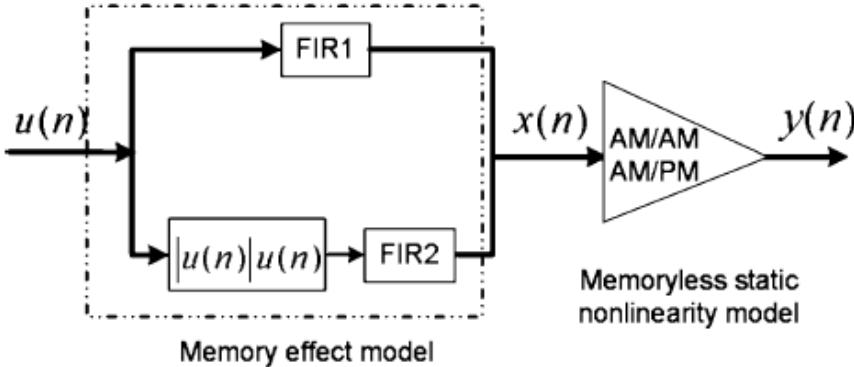
Claim No.	'561 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		 Fig. 16. Dynamic memory-effect model.  Fig. 17. Augmented Wiener transmitter model diagram. (Liu, at Figs. 16 and 17.) This augmented Wiener model is a cascade of a dynamic weak nonlinear model as a strong nonlinear static model. The strong nonlinear model, based on the smoothed AM/AM and AM/PM characteristics of the transmitters, is normally implemented by using lookup tables. The dynamic weak nonlinear model is composed of the new inclusive memory-effect model,

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		which takes into account the dynamic properties of the transmitters in the presence of the modulated communications signal. (Liu, at 3585.)  Fig. 19. Spectrum comparison of different transmitter models and the transmitter prototype. (a) Transmitter measurement. (b) Augmented Wiener model with two three-tap FIR filters. (c) Wiener model with a 64-tap FIR filter. (d) Memoryless model. (Liu, at Fig. 19.) In this paper, a nonanalytical modeling technique for the memoryless static nonlinear behaviors of RF transmitters based on a dynamic exponential weighted moving average

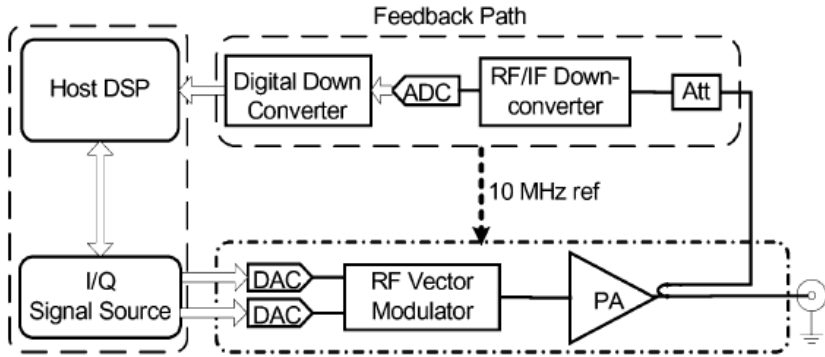
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		algorithm has been developed and validated. This technique is inherently so robust that it can be used for any type of RF transmitters exhibiting any complex gain shape variations. (Liu, at 3586.) To improve the relatively limited accuracy of the conventional Wiener model, an augmented Wiener model has been proposed, where the linear FIR filter is replaced with a weak nonlinear filter structure. (Liu, at 3586.) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, § II.B.2. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[a]	a first module characterizing dynamic nonlinear characteristics of the system, wherein the first module includes an input and an output; and	Liu discloses and/or renders obvious a first module characterizing dynamic nonlinear characteristics of the system, wherein the first module includes an input and an output. <i>See, e.g.:</i> In Section VI, a new comprehensive memory-effect model is proposed. This model is able to account for linear distortion (frequency response near the carrier) and weak nonlinear distortion due to baseband frequency response, harmonic loading conditions, and trap effects that might occur in semiconductor devices. Based on this new memory-effect model, an augmented Wiener model is established and found to be much more accurate than the conventional Wiener model in predicting ACPR levels of a wide-band 60-W peak-envelope-power (PEP) GaAs field-effect-transistor (FET) push-pull amplifier-based transmitter driven by multicarrier wide-band code-division multiple-access (WCDMA) signals.

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		(Liu, at 3579.)  Fig. 3. Wiener transmitter model diagram from [8]. (Liu, at Fig. 3.) A Wiener nonlinear model, shown in Fig. 3, consisting of a dynamic linear filter followed by a static nonlinear block, is adopted to construct a behavioral model of a wide-band RF transmitter. The static nonlinearity can be characterized by the lookup tables based on the AM/AM and AM/PM curves of the transmitter. These curves can be extracted directly from the baseband measurement data by means of a moving average procedure, as explained below. (Liu, at 3580.) The linear FIR filter in the Wiener model, as previously presented, takes into account the frequency response around the carrier frequency (linear distortion) and not the nonlinear even-order distortion sources. In fact, the extracted AM/AM and AM/PM characteristics of the dynamic memory-effect model, as shown in Figs. 6 and 7, are not completely symmetric

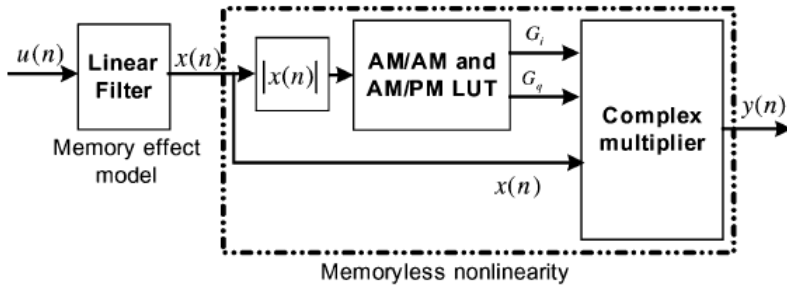
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		around the X-axis. This suggests that weak nonlinearities still exist even after deembedding static and strong nonlinearity from the measured data. For this reason, it is not sufficient to model these weak nonlinearities with a linear filter, as is normally done in conventional Wiener models. This also explains the relatively limited capability of the conventional Wiener model to predict the response of the transmitter. [] In this paper, a new comprehensive memory-effect model is proposed. As shown in Fig. 16, one can see that a new parallel branch is added to the linear FIR filter. In this new parallel branch, the input signal $u(n)$ is multiplied by its magnitude $u(n)$ and applied to another FIR filter. In this way, the linear FIR filter in the conventional Wiener model, as described in Section V, is replaced by a weak nonlinear dynamic FIR-based filter. The second-order terms are introduced to the dynamic memory-effect model in such a way as to make it able to mimic memory effects more accurately. (Liu, at 3584–85.)

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		 Fig. 16. Dynamic memory-effect model.  Fig. 17. Augmented Wiener transmitter model diagram. (Liu, at Figs. 16 and 17.) This augmented Wiener model is a cascade of a dynamic weak nonlinear model as a strong nonlinear static model. The strong nonlinear model, based on the smoothed AM/AM and AM/PM characteristics of the transmitters, is normally implemented by using lookup tables. The dynamic weak nonlinear model is composed of the new inclusive memory-effect model,

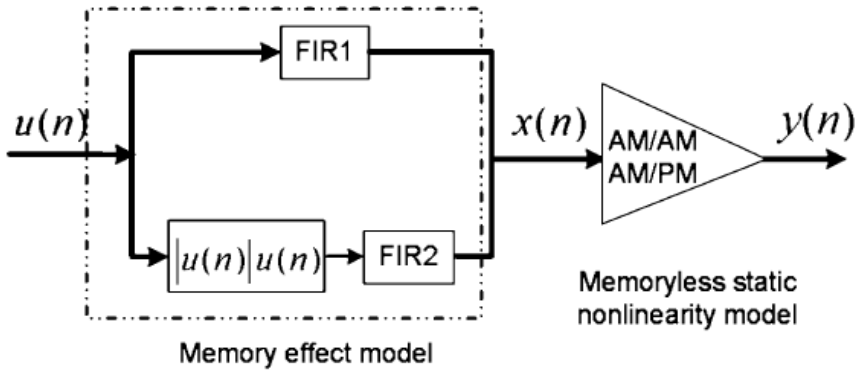
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		which takes into account the dynamic properties of the transmitters in the presence of the modulated communications signal. (Liu, at 3585.) Assuming that the two FIR filters have M_1 and M_2 taps, respectively, the input signal $u(n)$ and output signal $x(n)$ of the dynamic filter block in Fig. 17 can be written as follows: $x(n) = \sum_{i=0}^{M_1-1} a_i u(n-i) + \sum_{i=0}^{M_2-1} b_i u(n-i) u(n-i) \quad (21)$ where M_1 and M_2 denote the memory depth of the model. Equation (2) can also be used for the identification of the augmented Wiener model. After removing the strong static nonlinearity using (2), the identification of the coefficients a_i and b_i of the nonlinear filter can be simplified. Let $v(n-i) = u(n-i) u(n-i). \quad (22)$ Equation (21) can then be rewritten as $x(n) = \sum_{i=0}^{M_1-1} a_i u(n-i) + \sum_{i=0}^{M_2-1} b_i v(n-i). \quad (23)$ Consequently, (23) can be solved with a recursive least squares algorithm if (6) and (8) are modified as follows: $ \begin{aligned} W &= [a_0, a_1, \dots, a_{M_1-1}, b_0, b_1, \dots, b_{M_2-1}]^T \quad (24) \\ U &= [u(n), u(n-1), \dots, u(n-M_1+1), \\ &\quad v(n), v(n-1), \dots, v(n-M_2+1)] \\ n &= M, M+1, \dots, N \\ M &= \max(M_1, M_2) \quad (25) \end{aligned} $ where M is the larger one of M_1 and M_2. Since only the first and second-order terms of the input signals are included in this new model, the algorithm has good numerical stability.

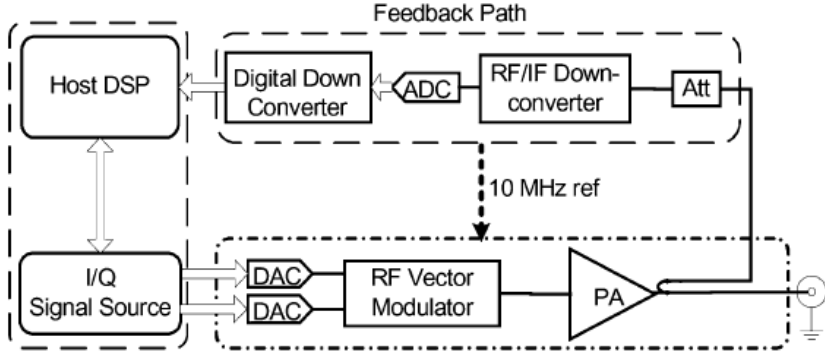
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		(Liu, at 3585.) To improve the relatively limited accuracy of the conventional Wiener model, an augmented Wiener model has been proposed, where the linear FIR filter is replaced with a weak nonlinear filter structure. . . . The spectrum comparison results between the different transmitter models and the transmitter prototype reveal that the proposed augmented Wiener transmitter model outperforms other models in predicting the spectrum regrowth caused by the memory effects of the wide-band transmitter. (Liu, at 3586.)  Fig. 18. Wide-band RF transmitter characterization platform. (Liu, at Fig. 18.) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of

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		ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, § II.B.2. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[b]	a second module characterizing static nonlinear characteristics of the nonlinear system, wherein the second module includes an input and an output;	Liu discloses and/or renders obvious a second module characterizing static nonlinear characteristics of the nonlinear system, wherein the second module includes an input and an output. <i>See, e.g.:</i> [I]t should be noted that all of the measured transmitter data in the following sections were captured using this transmitter prototype. . . . Since the output of the memoryless transmitter model only depends on the magnitude of the current input signal, this model is represented by the transmitter amplitude-modulation/amplitude-modulation (AM/AM) and amplitude-modulation/phase-modulation (AM/PM) lookup table model in this work. (Liu, at 3579.) A Wiener nonlinear model, shown in Fig. 3, consisting of a dynamic linear filter followed by a static nonlinear block, is adopted to construct a behavioral model of a wide-band RF transmitter. The static nonlinearity can be characterized by the lookup tables based on the AM/AM and AM/PM curves of the transmitter. (Liu, at 3580.)

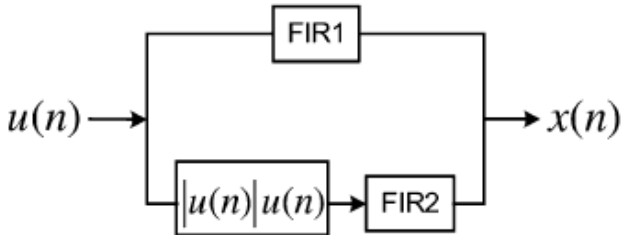
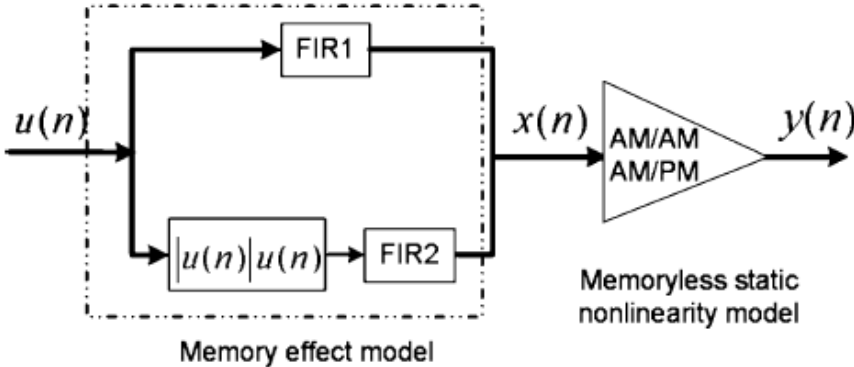
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		 Fig. 3. Wiener transmitter model diagram from [8]. (Liu, at Fig. 3.) Assuming that the linear filter in Fig. 3 is a FIR filter, then the input and output signals of the two blocks in Fig. 3 can be related as follows: $x(n) = \sum_{i=0}^{M-1} a_i u(n-i) \quad (1)$ $y(n) = (G_i + jG_q)x(n) = Gx(n) \quad (2)$ where $G = G_i + jG_q$ denotes the memoryless complex gain of the transmitter than depends only on the instantaneous magnitude of $x(n)$, M stands for the taps of the FIR filter, and a_i are the FIR filter coefficients. (Liu, at 3580.) Contrary to previous papers in the literature, the memoryless behavior of the transmitter is represented by a tabulated model (AM/AM and AM/PM) in this work. It allows us to alleviate the burden of the identification procedure of the analytical model's parameters, such as the high-order (even and odd) polynomial function's coefficients [15] and the Bessel series model's coefficients [7], particularly when the power amplifier (PA) operates in class AB.

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		Therefore, this modeling approach is robust, and is independent of the PA technology and its operation class. (Liu, at 3580.) The lookup table entries are determined from the AM/AM and AM/PM curves for the transmitter obtained by smoothing the dynamic characteristics using this exponentially weighted moving average. These entries encompass the in-phase and the quadrature components (G_i and G_q) of the complex compression gain corresponding to different magnitude values of $x(n)$. (Liu, at 3581.) The identification of the static nonlinear model on the basis of the dynamic characteristics of the transmitter allows us to fulfill the measured variables listed in Fig. 3. (Liu, at 3581.) To illustrate the contribution of time delay to the dispersion of AM/AM and AM/PM characteristics of the transmitter, a 0.63-ns delay under a 61.44-mega-sample per second (MSPS) sample rate condition was added while capturing the output of a memoryless transmitter model, which was constructed by the transmitter AM/AM and AM/PM lookup table. The AM/AM and AM/PM characteristics of the memoryless models with and without a 0.63-ns delay are shown in Figs. 8 and 9, respectively. (Liu, at 3582.) As mentioned earlier, the Wiener model consists of a dynamic linear block and a static nonlinear block. Thus, a pre-compensation of the static nonlinearity of the transmitter by applying its inverse function permits the decoupling of the out-of-band emission, which is caused by the memory effects, and the spectrum regrowth resulting from the memoryless

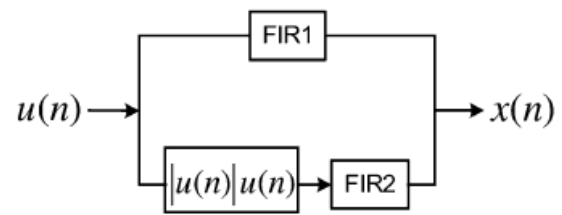
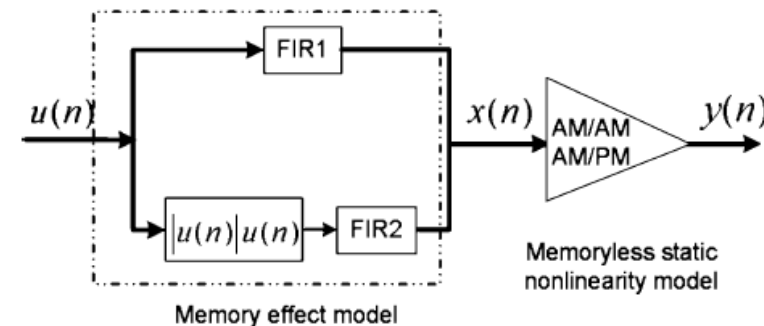
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		nonlinearity. In this way, the spectrum regrowth produced by the static nonlinearity is numerically removed from the output spectrum of the transmitter. (Liu, at 3583.)  Fig. 17. Augmented Wiener transmitter model diagram. (Liu, at Fig. 17.)

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		 Fig. 18. Wide-band RF transmitter characterization platform. (Liu, at Fig. 18.) This augmented Wiener model is a cascade of a dynamic weak nonlinear model and a strong nonlinear static model. The strong nonlinear model, based on the smoothed AM/AM and AM/PM characteristics of the transmitters, is normally implemented by using lookup tables. The dynamic weak nonlinear model is composed of the new inclusive memory-effect model, which takes into account the dynamic properties of the transmitters in the presence of the modulated communications signal. (Liu, at 3585.) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity

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		Contentions Cover Pleading, particularly, § II.B.2. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[c]	wherein the first module is coupled to the second module.	Liu discloses and/or renders obvious “wherein the first module is coupled to the second module.” <i>See, e.g.:</i> In this paper, a new comprehensive memory-effect model is proposed. As shown in Fig. 16, one can see that a new parallel branch is added to the linear FIR filter. In this new parallel branch, the input signal $u(n)$ is multiplied by its magnitude $u(n)$ and applied to another FIR filter. In this way, the linear FIR filter in the conventional Wiener model, as described in Section V, is replaced by a weak nonlinear dynamic FIR-based filter. The second-order terms are introduced to the dynamic memory-effect model in such a way as to make it able to mimic memory effects more accurately. (Liu, at 3584–85.)

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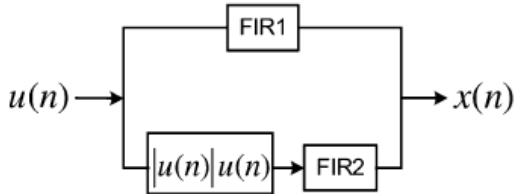
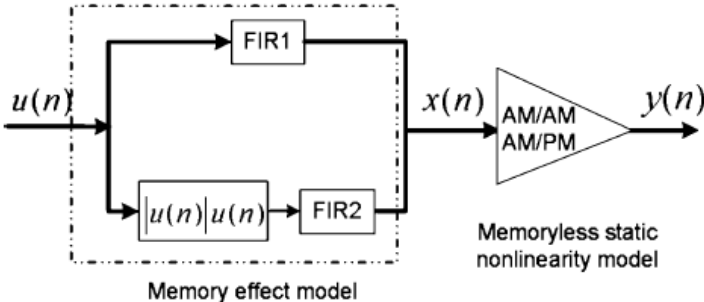
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		which takes into account the dynamic properties of the transmitters in the presence of the modulated communications signal. (Liu, at 3585.) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, § II.B.2. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
2	The model of claim 1, wherein the first module is coupled to the second module such that an output of the first module is input to the second module.	Liu discloses and/or renders obvious the model of claim 1, wherein the first module is coupled to the second module such that an output of the first module is input to the second module. <i>See</i> claim 1, <i>supra</i>, which is incorporated by reference herein. <i>See also, e.g.:</i> This augmented Wiener model is a cascade of a dynamic weak nonlinear model and a strong nonlinear static model. The strong nonlinear model, based on the smoothed AM/AM and AM/PM characteristics of the transmitters, is normally implemented by using lookup tables. The dynamic weak nonlinear model is composed of the new inclusive memory-effect model, which takes into account the dynamic properties of the transmitters in the presence of the modulated communications signal. (Liu, at 3585.)

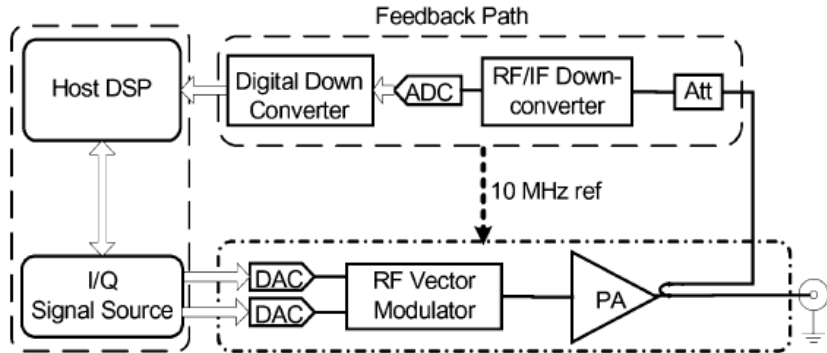
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		 Fig. 16. Dynamic memory-effect model.  Fig. 17. Augmented Wiener transmitter model diagram. (Liu, at Figs. 16 and 17.) A Wiener nonlinear model, shown in Fig. 3, consisting of a dynamic linear filter followed by a static nonlinear block, is adopted to construct a behavioral model of a wide-band RF transmitter. The static nonlinearity can be characterized by the lookup tables based on the AM/AM and AM/PM curves of the transmitter. (Liu, at 3580.)

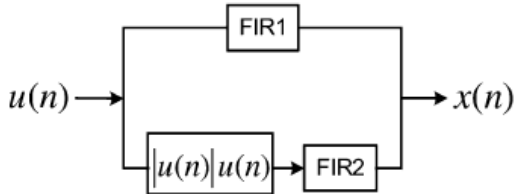
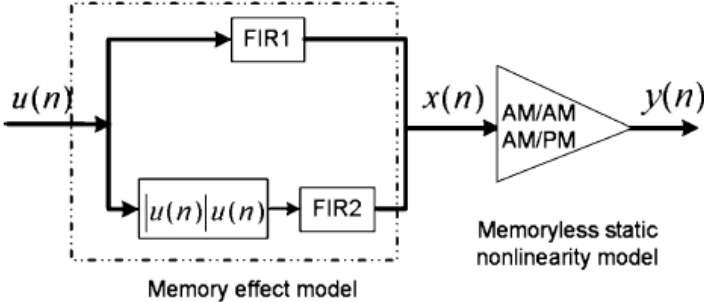
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		To improve the relatively limited accuracy of the conventional Wiener model, an augmented Wiener model has been proposed, where the linear FIR filter is replaced with a weak nonlinear filter structure. . . . The spectrum comparison results between the different transmitter models and the transmitter prototype reveal that the proposed augmented Wiener transmitter model outperforms other models in predicting the spectrum regrowth caused by the memory effects of the wide-band transmitter. (Liu, at 3586.) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, § II.B.2. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
3	The method of claim 1, wherein the second module is coupled to the first module such that an output of the second module is input to the first module.	Liu discloses and/or renders obvious “[t]he method of claim 1, wherein the second module is coupled to the first module such that an output of the second module is input to the first module.” <i>See</i> claims 1 and 2, <i>supra</i>, which are incorporated by reference herein. <i>See also, e.g.:</i> Alternatively, in [8], Crama and Rolain proposed a method that estimates the Wiener and Hammerstein structures based on a frequency-domain identification procedure using special multisine signals. However, the accuracy of the identification method is greatly compromised by the phase difference between the two channels used to sample the input and output of the device-under-test. Although a relative calibration can be applied with the assumption that one of the two channels is perfect, the identified model suffers from a lack

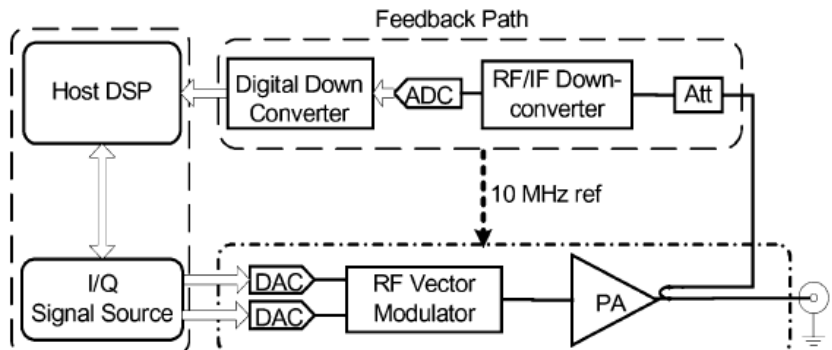
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		of accuracy due to the residual phase error. (Liu, at 3578.) Recently, Jantunen et al. [10] developed a nonlinear model with memory based on the Hammerstein structure (static nonlinearity + linear filter) to predict the behavior of a power amplifier for a fourth-generation mobile communications system. They employed a polynomial model for the nonlinearity and a finite impulse response (FIR) filter with a bulk delay for the linear component. (Liu, at 3579.) Contrary to previous papers in the literature, the memoryless behavior of the transmitter is represented by a tabulated model (AM/AM and AM/PM) in this work. It allows us to alleviate the burden of the identification procedure of the analytical model's parameters, such as the high-order (even and odd) polynomial function's coefficients [15] and the Bessel series model's coefficients [7], particularly when the power amplifier (PA) operates in class AB. Therefore, this modeling approach is robust, and is independent of the PA technology and its operation class. (Liu, at 3580.) In this paper, a nonanalytical modeling technique for the memoryless static nonlinear behaviors of RF transmitters based on a dynamic exponential weighted moving average algorithm has been developed and validated. This technique is inherently so robust that it can be used for any type of RF transmitters exhibiting any complex gain shape variations. (Liu, at 3586.) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to

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		teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, § II.B.2. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
4	The model of claim 1 wherein the first module comprises a nonlinear finite impulse response-based memory effect system and the second module comprises a look-up table-based nonlinear memoryless system.	Liu discloses and/or renders obvious “[t]he model of claim 1 wherein the first module comprises a nonlinear finite impulse response-based memory effect system and the second module comprises a look-up table-based nonlinear memoryless system.” <i>See</i> claim 1 and claim element 1[a], <i>supra</i>, which are incorporated by reference herein. <i>See also, e.g.:</i>

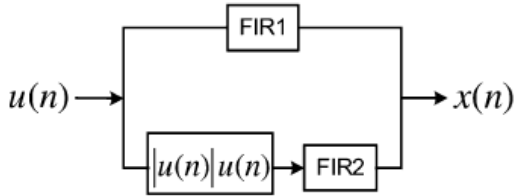
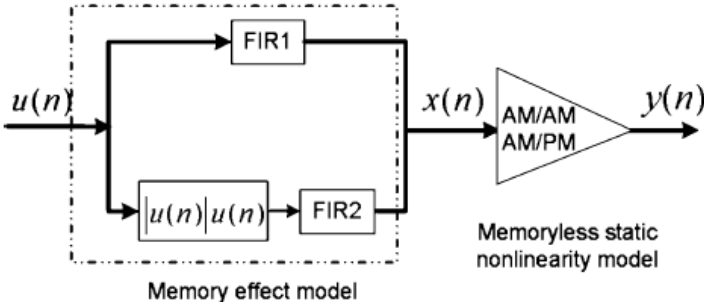
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		 Fig. 16. Dynamic memory-effect model.  Fig. 17. Augmented Wiener transmitter model diagram. (Liu, at Figs. 16 and 17.) In this paper, a new comprehensive memory-effect model is proposed. As shown in Fig. 16, one can see that a new parallel branch is added to the linear FIR filter. In this new parallel branch, the input signal $u(n)$ is multiplied by its magnitude $u(n)$ and applied to another FIR filter. In this way, the linear FIR filter in the conventional Wiener model, as described in Section V, is replaced by a weak nonlinear dynamic FIR-based filter. The second-order terms are introduced to the dynamic memory-effect model in such a way as to make it able to mimic memory effects more accurately.

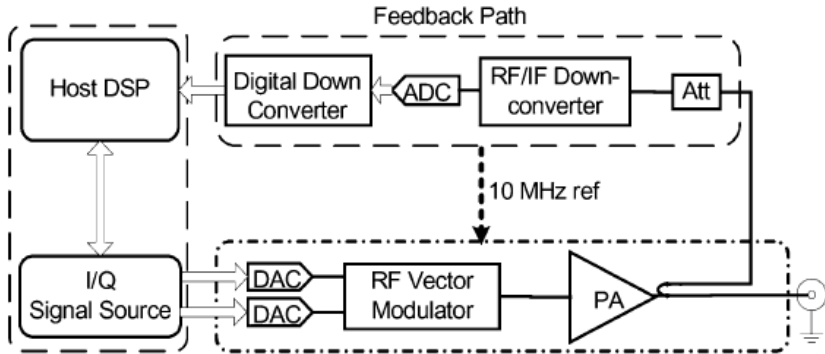
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		(Liu, at 3584–85.)  Fig. 18. Wide-band RF transmitter characterization platform. (Liu, at Fig. 18.) This augmented Wiener model is a cascade of a dynamic weak nonlinear model and a strong nonlinear static model. The strong nonlinear model, based on the smoothed AM/AM and AM/PM characteristics of the transmitters, is normally implemented by using lookup tables. The dynamic weak nonlinear model is composed of the new inclusive memory-effect model, which takes into account the dynamic properties of the transmitters in the presence of the modulated communications signal. (Liu, at 3585.) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine

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		this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, § II.B.2. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
5	The model of claim 1 wherein the first module is a dynamic weak nonlinear model and the second module is a static strong nonlinear model.	Liu discloses and/or renders obvious “[t]he model of claim 1 wherein the first module is a dynamic weak nonlinear model and the second module is a static strong nonlinear model.” See claim 1, <i>supra</i>, which is incorporated by reference herein. See also, e.g.:  Fig. 16. Dynamic memory-effect model.  Fig. 17. Augmented Wiener transmitter model diagram.

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		(Liu, at Figs. 16 and 17.) In this paper, a new comprehensive memory-effect model is proposed. As shown in Fig. 16, one can see that a new parallel branch is added to the linear FIR filter. In this new parallel branch, the input signal $u(n)$ is multiplied by its magnitude $u(n)$ and applied to another FIR filter. In this way, the linear FIR filter in the conventional Wiener model, as described in Section V, is replaced by a weak nonlinear dynamic FIR-based filter. The second-order terms are introduced to the dynamic memory-effect model in such a way as to make it able to mimic memory effects more accurately. (Liu, at 3584–85.)  Fig. 18. Wide-band RF transmitter characterization platform. (Liu, at Fig. 18.) This augmented Wiener model is a cascade of a dynamic weak nonlinear model and a strong nonlinear static model. The strong nonlinear model, based on the smoothed AM/AM and AM/PM characteristics of the transmitters, is normally implemented by using lookup tables. The dynamic weak nonlinear model is composed of the new inclusive memory-effect model,

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		which takes into account the dynamic properties of the transmitters in the presence of the modulated communications signal. (Liu, at 3585.) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, § II.B.2. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
6	The model of claim 1 wherein the first module comprises a finite impulse response filter-based multi-branch nonlinear system and the second module comprises two look-up tables, each look-up table dependent on the magnitude of the input signal.	Liu discloses and/or renders obvious “[t]he model of claim 1 wherein the first module comprises a finite impulse response filter-based multi-branch nonlinear system and the second module comprises two look-up tables, each look-up table dependent on the magnitude of the input signal.” <i>See</i> claim 1, <i>supra</i>, which is incorporated by reference herein. <i>See also, e.g.:</i> Since the output of the memoryless transmitter model only depends on the magnitude of the current input signal, this model is represented by the transmitter amplitude-modulation/amplitude-modulation (AM/AM) and amplitude-modulation/phase-modulation (AM/PM) lookup table model in this work. (Liu, at 3579.)

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		 Fig. 16. Dynamic memory-effect model.  Fig. 17. Augmented Wiener transmitter model diagram. (Liu, at Figs. 16 and 17.) In this paper, a new comprehensive memory-effect model is proposed. As shown in Fig. 16, one can see that a new parallel branch is added to the linear FIR filter. In this new parallel branch, the input signal $u(n)$ is multiplied by its magnitude $u(n)$ and applied to another FIR filter. In this way, the linear FIR filter in the conventional Wiener model, as described in Section V, is replaced by a weak nonlinear dynamic FIR-based filter. The second-order terms are introduced to the dynamic memory-effect model in such a way as to make it able to mimic memory effects more accurately.

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		(Liu, at 3584–85.)  Fig. 18. Wide-band RF transmitter characterization platform. (Liu, at Fig. 18.) This augmented Wiener model is a cascade of a dynamic weak nonlinear model and a strong nonlinear static model. The strong nonlinear model, based on the smoothed AM/AM and AM/PM characteristics of the transmitters, is normally implemented by using lookup tables. The dynamic weak nonlinear model is composed of the new inclusive memory-effect model, which takes into account the dynamic properties of the transmitters in the presence of the modulated communications signal. (Liu, at 3585.) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine

Claim No.	'561 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, § II.B.2. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
7[pre]	A predistorter for nonlinear wireless system, the predistorter comprising:	To the extent the preamble is limiting, Liu discloses and/or renders obvious a predistorter for a nonlinear wireless system. <i>See</i> claim 1, <i>supra</i> , which is incorporated by reference herein.
7[a]	a dynamic nonlinear predistorter module; and	Liu discloses and/or renders obvious a dynamic nonlinear predistorter module. <i>See</i> claim 1 and claim elements 1[a], <i>supra</i> , which are incorporated by reference herein.
7[b]	a static nonlinear predistorter module coupled to the dynamic nonlinear predistorter module such that an output of the dynamic nonlinear predistorter module is input to the static nonlinear predistorter module.	Liu discloses and/or renders obvious a static nonlinear predistorter module coupled to the dynamic nonlinear predistorter module such that an output of the dynamic nonlinear predistorter module is input to the static nonlinear predistorter module. <i>See</i> claim 1 and claim element 1[b], <i>supra</i> , which are incorporated by reference herein.
8	The predistorter of claim 7 wherein the dynamic nonlinear predistorter is a finite impulse response-based memory effect predistorter and the static nonlinear predistorter is a look-up table-based memoryless predistorter.	Liu discloses and/or renders obvious the predistorter of claim 7 wherein the dynamic nonlinear predistorter is a finite impulse response-based memory effect predistorter and the static nonlinear predistorter is a look-up table-based memoryless predistorter. <i>See</i> claims 1, 4 and 7, <i>supra</i> , which are incorporated by reference herein.

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9	The predistorter of claim 7 wherein the dynamic nonlinear predistorter is a dynamic weak nonlinear predistorter and the static nonlinear predistorter is a static strong nonlinear predistorter.	Liu expressly or inherently discloses this claim element. <i>See</i> claims 1, 5 and 7, <i>supra</i> , which are incorporated by reference herein.
10	The predistorter of claim 9 wherein the dynamic weak nonlinear predistorter is implemented as a finite impulse response filter-based multi-branch nonlinear structure embedded within a polynomial like series and the static strong nonlinear predistorter includes two look-up tables, each look-up table depends on the magnitude of a current input signal.	Liu discloses and/or renders obvious the predistorter of claim 9 wherein the dynamic weak nonlinear predistorter is implemented as a finite impulse response filter-based multi-branch nonlinear structure embedded within a polynomial like series and the static strong nonlinear predistorter includes two look-up tables, each look-up table depends on the magnitude of a current input signal. <i>See</i> claims 1, 5, 6 and 9, <i>supra</i> , which are incorporated by reference herein.
11[pre]	A predistorter for nonlinear wireless system, the predistorter comprising:	To the extent the preamble is limiting, Liu discloses and/or renders obvious a predistorter for nonlinear wireless system. <i>See</i> claim 1 and claim elements 1[pre] and 7[pre], <i>supra</i> , which are incorporated by reference herein.
11[a]	a static nonlinear predistorter module; and	Liu discloses and/or renders obvious a static nonlinear predistorter module. <i>See</i> claim 1 and claim element 1[b], <i>supra</i> , which are incorporated by reference herein.

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11[b]	dynamic nonlinear predistorter module coupled to the static nonlinear predistorter module such that an output of the static nonlinear predistorter module is input to the dynamic nonlinear predistorter module.	Liu discloses and/or renders obvious a dynamic nonlinear predistorter module coupled to the static nonlinear predistorter module such that an output of the static nonlinear predistorter module is input to the dynamic nonlinear predistorter module. <i>See</i> claims 1, 3, and claim element 1[a], <i>supra</i> , which are incorporated by reference herein.
12	The predistorter of claim 11 wherein the dynamic nonlinear predistorter module is a finite impulse response-based memory effect predistorter module and the static nonlinear predistorter is a look-up table-based memoryless predistorter module.	Liu discloses and/or renders obvious the predistorter of claim 11 wherein the dynamic nonlinear predistorter module is a finite impulse response-based memory effect predistorter module and the static nonlinear predistorter is a look-up table-based memoryless predistorter module <i>See</i> claims 1, 4, and 11, <i>supra</i> , which are incorporated by reference herein.
13	The predistorter of claim 11 wherein the dynamic nonlinear predistorter module is a dynamic weak nonlinear predistorter module and the static nonlinear predistorter is a static strong nonlinear predistorter module.	Liu discloses and/or renders obvious the predistorter of claim 11 wherein the dynamic nonlinear predistorter module is a dynamic weak nonlinear predistorter module and the static nonlinear predistorter is a static strong nonlinear predistorter module. <i>See</i> claims 1, 5, 9, and 11, <i>supra</i> , which are incorporated by reference herein.
14	The predistorter of claim 12 wherein the dynamic weak nonlinear predistorter is implemented as a finite impulse response filter-based multi-branch nonlinear structure and the static strong nonlinear predistorter	Liu discloses and/or renders obvious the predistorter of claim 12 wherein the dynamic weak nonlinear predistorter is implemented as a finite impulse response filter-based multi-branch nonlinear structure and the static strong nonlinear predistorter includes two look-up tables, each look-up table depends on the magnitude of a current input signal. <i>See</i> claims 1, 6, 10 and 12, <i>supra</i> , which are incorporated by reference herein.

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	includes two look-up tables, each look-up table depends on the magnitude of a current input signal.	
15[pre]	An augmented Wiener predistorter, the predistorter comprising:	To the extent the preamble is limiting, Liu discloses and/or renders obvious an augmented Wiener predistorter. <i>See</i> claims 1, 7, and 11, <i>supra</i> , which are incorporated by reference herein.
15[a]	a dynamic nonlinear first order predistorter module; and	Liu discloses and/or renders obvious a dynamic nonlinear first order predistorter module. <i>See</i> claims 1, 7, and 11 and claim elements 1[a], 7[a], and 11[b], <i>supra</i> , which are incorporated by reference herein.
15[b]	a static nonlinear predistorter module coupled to the dynamic nonlinear predistorter module such that an output of the dynamic nonlinear predistorter module is input to the static nonlinear predistorter module.	Liu discloses and/or renders obvious a static nonlinear predistorter module coupled to the dynamic nonlinear predistorter module such that an output of the dynamic nonlinear predistorter module is input to the static nonlinear predistorter module. <i>See</i> claim 3 and claim elements 1[b], 1[c], 7[b], and 11[a], <i>supra</i> , which are incorporated by reference herein.
16	The predistorter of claim 15 wherein the dynamic nonlinear predistorter is a finite impulse response-based memory effect predistorter and the static nonlinear predistorter is a look-up table-based memoryless predistorter.	Liu discloses and/or renders obvious the predistorter of claim 15 wherein the dynamic nonlinear predistorter is a finite impulse response-based memory effect predistorter and the static nonlinear predistorter is a look-up table-based memoryless predistorter. <i>See</i> claims 1, 4, 8, and 15, <i>supra</i> , which are incorporated by reference herein.

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17	The predistorter of claim 15 wherein the dynamic nonlinear predistorter is a dynamic weak nonlinear predistorter and the static nonlinear predistorter is a static strong nonlinear predistorter.	Liu discloses and/or renders obvious the predistorter of claim 15 wherein the dynamic nonlinear predistorter is a dynamic weak nonlinear predistorter and the static nonlinear predistorter is a static strong nonlinear predistorter. <i>See</i> claims 1, 5, 9, 13, and 15, <i>supra</i> , which are incorporated by reference herein.
18	The predistorter of claim 17 wherein the dynamic weak nonlinear predistorter is implemented as a finite impulse response filter-based multi-branch nonlinear structure and the static strong nonlinear predistorter includes two look-up tables, each look-up table depends on the magnitude of a current input signal.	Liu discloses and/or renders obvious the predistorter of claim 17 wherein the dynamic weak nonlinear predistorter is implemented as a finite impulse response filter-based multi-branch nonlinear structure and the static strong nonlinear predistorter includes two look-up tables, each look-up table depends on the magnitude of a current input signal. <i>See</i> claims 1, 5, 6, 9, 10, 14 and 17, <i>supra</i> , which are incorporated by reference herein.
19[pre]	An augmented Hammerstein predistorter, the predistorter comprising:	To the extent the preamble is limiting, Liu discloses and/or renders obvious an augmented Hammerstein predistorter. <i>See</i> claims 1, 3, 7, 11, and 15, <i>supra</i> , which are incorporated by reference herein.
19[a]	a static nonlinear predistorter module; and	Liu discloses and/or renders obvious a static nonlinear predistorter module. <i>See</i> claims 1 and 15 and claim elements 1[b], 7[b], and 11[a], <i>supra</i> , which are incorporated by reference herein.
19[b]	a dynamic nonlinear first order predistorter module coupled to the static nonlinear predistorter module such that an output of the static	Liu discloses and/or renders obvious a dynamic nonlinear first order predistorter module coupled to the static nonlinear predistorter module such that an output of the static nonlinear predistorter module is input to the dynamic nonlinear predistorter module.

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	nonlinear predistorter module is input to the dynamic nonlinear predistorter module.	<i>See</i> claims 1, 3, and 15 and claim elements 1[a], 1[c], 7[a], and 11[b], <i>supra</i> , which are incorporated by reference herein.
20	The predistorter of claim 19 wherein the dynamic nonlinear predistorter module is a finite impulse response-based memory effect predistorter module and the static nonlinear predistorter is a look-up table-based memoryless predistorter module.	Liu discloses and/or renders obvious the predistorter of claim 19 wherein the dynamic nonlinear predistorter module is a finite impulse response-based memory effect predistorter module and the static nonlinear predistorter is a look-up table-based memoryless predistorter module. <i>See</i> claim 1, 4, 8, 16, and 19, <i>supra</i> , which are incorporated by reference herein.
21	The predistorter of claim 19 wherein the dynamic nonlinear predistorter module is a dynamic weak nonlinear predistorter module and the static nonlinear predistorter is a static strong nonlinear predistorter module.	Liu discloses and/or renders obvious the predistorter of claim 19 wherein the dynamic nonlinear predistorter module is a dynamic weak nonlinear predistorter module and the static nonlinear predistorter is a static strong nonlinear predistorter module. <i>See</i> claim 1, 5, 9, 13, 17, and 19, <i>supra</i> , which are incorporated by reference herein.
22	The predistorter of claim 21 wherein the dynamic weak nonlinear predistorter is implemented as a finite impulse response filter-based multi-branch nonlinear structure and the static strong nonlinear predistorter includes two look-up tables, each look-up table depends on the magnitude of a current input signal.	Liu discloses and/or renders obvious the predistorter of claim 21 wherein the dynamic weak nonlinear predistorter is implemented as a finite impulse response filter-based multi-branch nonlinear structure and the static strong nonlinear predistorter includes two look-up tables, each look-up table depends on the magnitude of a current input signal. <i>See</i> claim 1, 6, 10, 14, 18, and 21, <i>supra</i> , which are incorporated by reference herein.

