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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2).

Docket No.: 61605-8730	Type (+) inside box [+]

INVENTOR(S)/APPLICANT(S)			
LAST NAME	FIRST NAME	MI	RESIDENCE (City and Either State or Foreign County)
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TITLE OF THE INVENTION (280 Characters)

Embedded Modulations

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ENCLOSED APPLICATION PARTS ***(check all that apply)***

[x] Specification Number of Pages [5] [ ] Small Entity

[x] Drawings Number of Sheets [1] [ ] Other (specify):

METHOD OF PAYMENT ***(check one)***

[x] The Commissioner is authorized to charge Paradyne Corporation's **Deposit Account No. 16-0255** [x] The Commissioner is authorized to charge any additional fees and credit over payment to **Deposit Account No. 16-0255**	PROVISIONAL FILING FEE AMOUNT ($)	$150.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

[x] No.
[ ] Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully submitted,

SIGNATURE: [signature] DATE: Dec 5, 1997

TYPE or PRINTED NAME: Daniel R. McClure REGISTRATION NO.: 38,962

[ ] Additional inventors are being named on separately numbered sheets attached hereto.

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Apple Exhibit 1114

1 **Abstract:**

Write here a concise description of the invention. Attempt to identify unique aspects. Convey essential details. Do not defer to any attachment.

A new method is introduced that permits concurrent use of different types of modems ... with drastically different levels of complexity and cost (10:1) ... in a simultaneous multiple access communication system (such as that provided to date by Pinnacle). With this method, two or more premise modem types ... each with its own price/performance point ... can communicate to a single central telco point. Such capability is important to achieve the ability to offer both moderately-priced equipment/service such as Internet access and extremely low-cost equipment/service such as electrical power monitoring/control. Embedded modulation permits a secondary modulation to replace the usual primary modulation user data segment normally located after the primary training sequence and the primary trailing sequence. This is done in such a way that a master multipoint modem can seamlessly communicate with both primary and secondary type tributary modems without data session disruption.

2 **Background, Present State-of-the-Art and Similar Designs:**

Briefly describe the present state-of-the-art of the technology field to which the invention applies. List and describe similar or related designs o which you are aware. Do not defer to any attachment. It is NOT necessary for the inventor(s) to do patent searches to answer this question.

In data communications to date, a given data transmitter/receiver (modem) always successfully communicates only with a modem that is compatible at the modulation or physical layer. This is true whether the data network architecture is point-to-point, multipoint, broadcast, star or other. For example, in (point-to-point) dial modems both communicating modems must operate, for example, in the V.34 mode or in the V.22 mode. As another example, in a multipoint architecture all modems must operate, for example, in V.27bis mode. Although the modem equipments may contain several selectable modulations, a single common operating modulation must be negotiated at the beginning of an attempted data session and any necessity to change modulation requires data disruption and a new negotiation session.

In a point-to-point communications architecture, if a modem attempts to establish a communication session with an incompatible modem, one or both of the modems will typically attempt several times to communicate and then cease further attempts. Communication on the link is impossible. The solution demands replacing at least one of the modems so that both have a common operating modulation.

In a multipoint architecture, wherein a single "central site" (**master**) modem communicates to two or more "tributary" (**trib**) modems, the master communicates to all tribs with a single modulation method. If one or more of the tribs is not compatible, the master can not communicate with that trib. Moreover, repeated attempts by the master to communicate with that incompatible trib will disturb communication to any compatible tribs due to wasted communication attempt time. It is seen that no attempt is made in the prior art to mix incompatible trib modulations in a multipoint architecture.

In the prior art, modems attempting to negotiate communication eventually seek to find a common modulation method (for example, after call establishment and network device disabling signaling in dial modems). If a common modulation method is found, the modems will then exchange sequences of signals that are particular subsets of all signals that can be communicated in the common modulation method. These sequences are commonly referred to as "**training** signals" and may be used to (1) confirm the common modulation method is available, (2) establish received signal level compensation, (3) establish time recovery and perhaps carrier recovery, (4) permit channel equalization and perhaps echo-cancellation, (5) exchange parameters needed to optimize performance and select certain optional features and (6) confirm successful achievement of all above prior to user data communication. In a multipoint architecture, the training also may include (7) the address of the communicating trib. Furthermore, at the end of a data session the modems may exchange other signals ("**trailing** signals") for the purpose of reliably stopping the session and confirming that it has been stopped. This is crucial for multipoint where failure to detect end of a session will delay or disrupt the next session.

Note that not all aspects of the training and trailing signals need be included. In Pinnacle, the training signal consists of a Start-of-Frame (SOF) Symbol followed by SOF information encoded into modulation. The trailing signal consists of end-of-frame (EOF) information followed by an EOF symbol.

Continuing with the prior art, successful multipoint communication involves the following:

1. Establishing a single common modulation method between all modems, both master and all tribs,
2. Communicating training sequences of the common modulation between the master and one trib followed by:
3. Communicating data by the common modulation between the master and one trib,
4. Communicating trailing sequences of the common modulation between the master and one trib,
5. after which 2-3 are repeated between the master and another trib.

Such multipoint communication signaling is depicted in **Figure 1**. Here the master transmits first to all tribs and that transmission includes information that requests Trib #1, and only Trib #1, to return a transmission. Upon successfully receiving the Trib #1 transmission, the master transmits to all tribs and that transmission includes information that requests Trib #2, and only Trib #2, to return a transmission. (Note that Figure 1 implies a two-wire half-duplex multipoint system, but the concept is often replied to four-wire systems as well.)

2	**Background, Present State-of-the-Art and Similar Designs (CONTINUED):**
	Failure to successfully complete all above signalings causes the data sessions to fail and a disruptive recovery mechanism must ensue that attempts to restart. In a simultaneous multiple access (**SMA**) DSL system, such as that provided by Pinnacle and disclosed via various Paradyne patent disclosures, a master communicates with one or more tribs over a single wire pair. Communication is polled multipoint: that is, the master controls the initiation of its own transmission (**outbound**) and allows the transmission of each tribs (**inbound**). This polled communication may involve either half-duplex or full-duplex outbound and inbound. According to the prior art, all tribs must have a common modulation. Yet, there is desire for one (moderately-priced) trib to be able to communicate at the highest reliable data rate for some applications such as Internet access while another (lowest-cost) trib is communicating at a lower data rate for other applications such as power monitoring/control. These communications must occur nearly concurrently without disruption to one another. That is, an attempt to control power must be successful at all times, whether or not the Internet is being accessed. And such an attempt must not significantly degrade or disrupt the Internet access. These needs can not be properly met by a single modulation. A high performance modulation, such as QAM, CAP or DMT, that is initially optimized for high performance and will continue to be improved, will demand state-of-the art implementation devices that are relatively costly. This is true even if such a high performance modulation is "degraded" to operate at its lowest data rate and with its poorest acceptable performance. A low performance modulation, such as FSK, PAM or DSB, may implemented in much, much less expensive devices. It is acceptable for a master modem to have the cost/performance demanded by the high performance modulation. As can be seen with reference to Figure 2, if two tribs have different transmit and receive modulations the multipoint data session can not reliably operate. Assume the master and trib #1 have modulation type A and trib #2 has modulation type B. As the master transmits, this immediately causes disruptive reception in trib #2. Thus trib #2 is unaware of any communication attempt by the master and certainly cannot receive any information. This usually causes disruption in the overall communications due to the master waiting excessively for a response from Trib #2. Note also that any attempt by Trib #2 to unilaterally attempt transmission to the master will similarly disrupt communications

3 **Summary Description:**

Describe the invention in the general terms of the technology to which the invention pertains. If necessary, refer to included or attached diagrams and figures. This description should not exceed perhaps 10 pages

Embedded modulation permits a secondary modulation to replace the usual primary modulation user data segment normally located after the primary training sequence and the primary trailing sequence. This is done in such a way that a master multipoint modem can seamlessly communicate with both primary and secondary type tributary modems.

In embedded modulations, the Type A and Type B master modem conveys information to Type A & Type B tribs. Reference Figure 3.

For communication with Type A tribs, the normal Pinnacle or prior art sequence is followed (refer to Figure 4a). As seen below, the Type B tribs (conditioned to ignore Type A signals) ignore Type A communications. For communication with Type B tribs, the master (refer to Figure 4b):

1. begins transmission of modulation Type A,
2. notifies, via the training sequence, tribs Type A of an impending change to Type B (perhaps for a stipulated amount of time or bits),
3. changes to modulation Type B and conveys user information (perhaps a stipulated amount) and likely a trib address,
4. reverts to Type A and transmits a trailing sequence at the conclusion of its transmission poll,
5. conditions itself to receive either Type A or Type B according to the trib modulation it requested in response to the above transmission sequence.

Type A tribs ignore the above communication to Type B without disruption or passing incorrect user data:

1. correctly receive the master Type A modulation and training sequence and notification of impending Type B,
2. condition themselves to ignore type B signals, locking normal receiver algorithms to avoid disruptive signals and incorrect data,
3. condition themselves to correctly receive only a Type A trailing sequence,
4. remain silent and await a Type A modulation addressed to the trib in question.

Type B tribs receive the Type B information:

1. condition themselves to ignore Type A modulations and to receive Type B modulations,
2. receive the Type B user information which will usually contains addressing for a particular trib,
3. conclude reception of Type B (perhaps at the end of a stipulated amount of time),
4. if the address requested so, transmit Type B information to the master per the poll request (otherwise remain silent),
5. revert to ignoring non-type B signals.

Note that the above can be extended to additional types of modulations and can be extended to other multi-modem network topologies.

Extensions:

It should be understood that the above description can be improved. As noted above, the concepts can be extended to more than two types of modulations and other communication topologies. Also, information can be added to the Type A training and trailing sequences that bolster performance or assure better error performance or improve reliability. Likewise, information can be added to the Type B data signal to achieve similar benefits. Furthermore, the physical layer attributes of Type B can be altered.

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