Jacobsen Declaration Exhibit AL

NMRA Software Architecture Status

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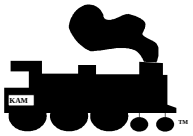
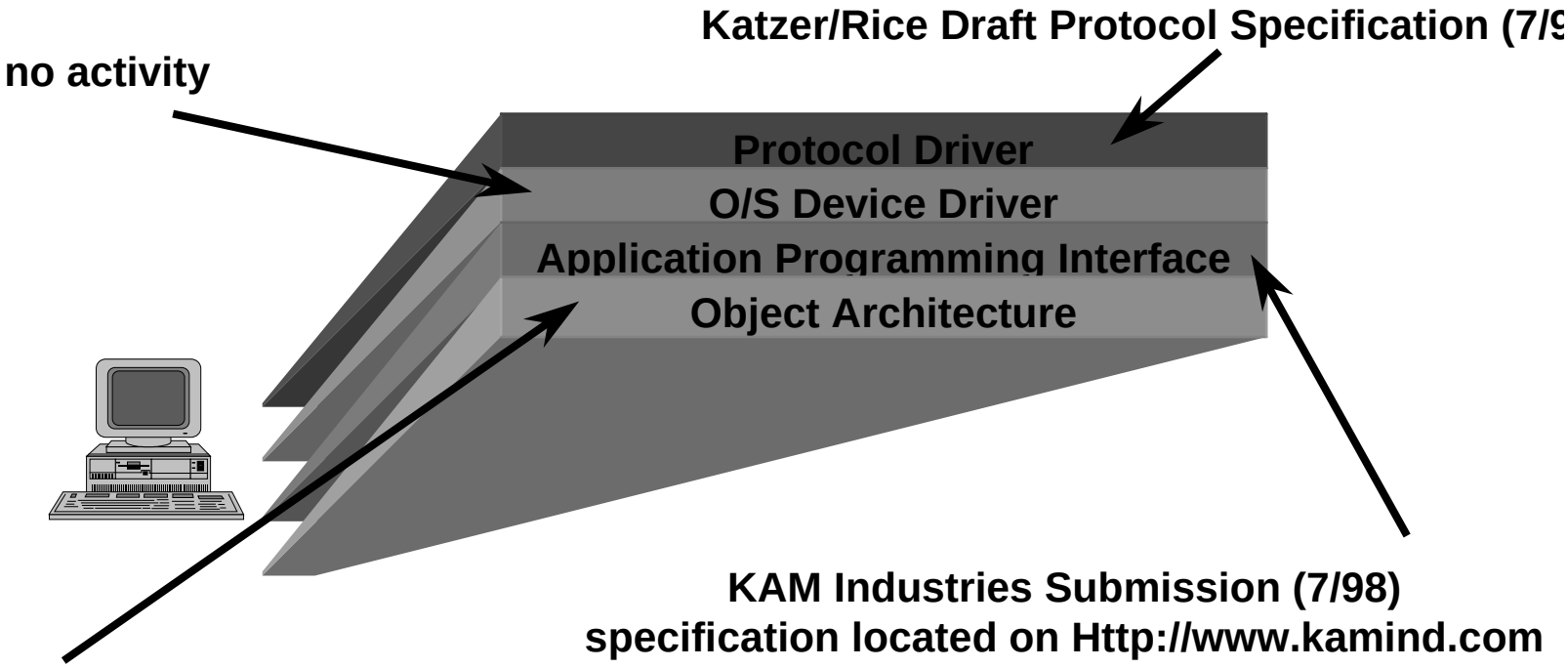


Status of NMRA Application S/W Architecture Model

- **There are four parts to the NMRA DCC software architecture model**



Status of NMRA Application S/W Architecture Model (cont.)

- **Protocol Level**
  - **hardware Products**
    - » North Coast Engineering, Wangrow Electronics
    - » Easy DCC
    - » ZTC systems
  - **Software drivers for command station hardware**
    - » WinLok, Engine Commander®, Railroad Company Tayden Design
  - **Generic draft protocol driver**
    - » Engine Commander®

Status of NMRA Application S/W Architecture Model (cont.)

- **Device Driver Level**
  - » no activity
- **Application Interface Level**
  - – **hardware Products**
    - » not applicable to hardware
  - – **Microsoft COM/DCOM implementation of API**
    - » Engine Commander®
    - » Computer Dispatcher® (March 98)
    - » Generic type library available for linking with application written in Java, Visual Basic, C/C++
  - – **CORBA support**
    - » no activity

Status of NMRA Application S/W Architecture Model (cont.)

- **Object level**
  - **Rosa application model proposed (update on http://www.digi-toys.com)**
  - **hardware Products**
    - » not applicable to hardware
  - **Software products**
    - » Engine Commander® and Train Server® conforms in architecture model
  - **COM support**
    - » no activity
  - **CORBA support**
    - » no activity

API command summary

- **API Command classes**
  - CV
  - Engine
  - Consist
  - Accessory
  - Command
  - Programming
  - Communications
  - Command
  - Decoder
  - Cab
  - Feedback
  - Callback methods

These are the major classes of commands needed in most DCC software applications.

We have implemented Engine Commander® and are in the development phase of Computer Dispatcher®

•Train Tools API

- **Fucntions**
- **DccCVGetValue();**
  DccCVSetValue();
  DccCVGetStatus();
  DccCVSetStatus();
  DccCVGetName();
  DccCVGetMaxRegister();
  DccCVGetMinRegister();
- **Accessory Commands**

  DccAccGetFunction( );
  DccAccSetFunction( );
  DccAccGetFunctionAll( );
  DccAccSetFunctionAll( );
  DccAccGetFunctionMax( );
  DccAccGetName( );
  DccAccSetName( );
  DccAccGetFunctionName( );
  DccAccSetFunctionName( );

Train Tools API (cont.)

- **Engine**

  DccEngGetSpeed( );
  DccEngSetSpeed( );
  DccEngGetFunction( );
  DccEngSetFunction( );
  DccEngGetFunctionMax( );
  DccEngGetName( );
  DccEngSetName( );
  DccEngGetFunctionName( );
  DccEngSetFunctionName( );
  DccEngGetSpeedSteps( );
  DccEngSetSpeedSteps( );

- **Consist**

  DccEngConsistGetMax( );
  DccEngConsistSetParent( );
  DccEngConsistAddUnit( );
  DccEngConsistRemoveUnit( );
  DccEngConsistGetParent( );

Train Tools API(cont.)

- **Command Station**

  DccOprGetStationStatus();
  DccOprTurnOnStation();
  DccOprStartStation();
  DccOprClearStation();
  DccOprStopStation();
  DccOprPowerOn();
  DccOprPowerOff();
  DccOprHardReset();
  DccOprEmergencyStop();

- **Programming**

  DccProgramGetStatus();
  DccProgramSetMode( );
  DccProgramGetMode( );
  DccProgramWriteCV( );
  DccProgramReadCV( );
  DccProgramWriteDecoderToDataBase( );
  DccProgramReadDecoderFromDataBase( );

Train Tools API(cont.)

- **Communications**

  DccProgramGetStatus();
  DccProgramSetMode( );
  DccProgramGetMode( );
  DccProgramWriteCV( );
  DccProgramReadCV( );
  DccProgramWriteDecoderToDataBase( );
  DccProgramReadDecoderFromDataBase( );

- **Command**

  DccCmdCommand( );
  DccCmdConnect( );
  DccCmdDisConnect( );

- **Cab**

  DccCabWriteMessage( );
  DccCabReadMessage( );
  DccCabSetDccObject( );
  DccCabGetDccObject( );
  DccCabAdd( );
  DccCabDelete( );
  DccCabTranslate( );
  DccCabLookupDccObject( );

Train Tools API(cont.)

- **Decoder**

  DccDecoderGetMaxModels();
  DccDecoderGetModelName();
  DccDecoderGetMaxAddress();
  DccDecoderCheckAddrInUse();
  DccDecoderGetMfgName( );
  DccDecoderGetPowerMode( );
  DccDecoderAddAddr()
  DccDecoderGetModelFacility()
  DccDecoderReconnectObject( );
  DccDecoderChangeAddress( )
  DccDecoderTranslate( )
  DccDecoderSetModelToObject()
  DccDecoderGetMaxSpeed( );
  DccDecoderGetObjectCount()
  DccDecoderGetObjectAtIndex()
  DccDecoderDel( );
  DccDecoderGetErrorState( )

Train Tools API(cont.)

- **Feedback**

  DccFeedbackErrorMessage( );
  DccFeedbackAccessoryBit( );
  DccFeedbackAccessoryAll( );
  DccFeedbackEngineResponse( );
  DccFeedbackCV( );
  DccFeedbackMessagesCab( );
  DccFeedbackMisc( );

- **Callbacks**

  DccResponseErrorMessage();
  DccResponseAccessoryBit();
  DccResponseAccessoryAll();
  DccResponseEngineResponse();
  DccResponseCV();
  DccResponseCabMessage();
  DccResponseMisc();

Train Tools Api(cont.)

- **Time**

  DccMiscGetClockTime( );
  DccMiscSetClockTime( );

- **Command Station**

  DccMiscGetControllerName( );
  DccMiscGetControllerNameAtPort( );
  DccMiscGetCommandStationIndex( );
  DccMiscMaxControllerID( );
  DccMiscSetCommandStationValue( );
  DccMiscGetCommandStationValue( );
  DccMiscGetControllerFacility( );

- **Misc**

  DccMiscGetErrorMsg ( );
  DccMiscGetApiName( );
  DccMiscGetInterfaceVersion( );
  DccMiscSaveData( );

Questions ?

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