Trusted Storage

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Seagate Technology

- TRUST -

system behaves as designed

Cryptographic **SIGNING**

- PlaintextMessage + Signed(Hash(PlaintextMessage))
  - **Hash** = Reduces message to 20 Bytes (2^160th number)
  - **Sign** = Encrypts with a private key that only the corresponding public key can decrypt and verify
- Microsoft signs the Microsoft software proving it is the software from Microsoft…
- X signs Y and Y signs Z -- **Chain of Trust**

CREDENTIALS: X.509 Certificate is a SIGNED attestation of a fact or claim

- Basis for Trust in ALL BANKING WORLDWIDE
- Basis for Trust in Windows and Linux and Web

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Root of Trust

Hardware that

cannot change

can digitally sign

and therefore can start off a chain of trust.

A TPM (trusted platform module) is a tiny processor on the motherboard that can sign and can't have its firmware modified.

Disk Drives can be roots of trust since you can't upload firmware to change them.

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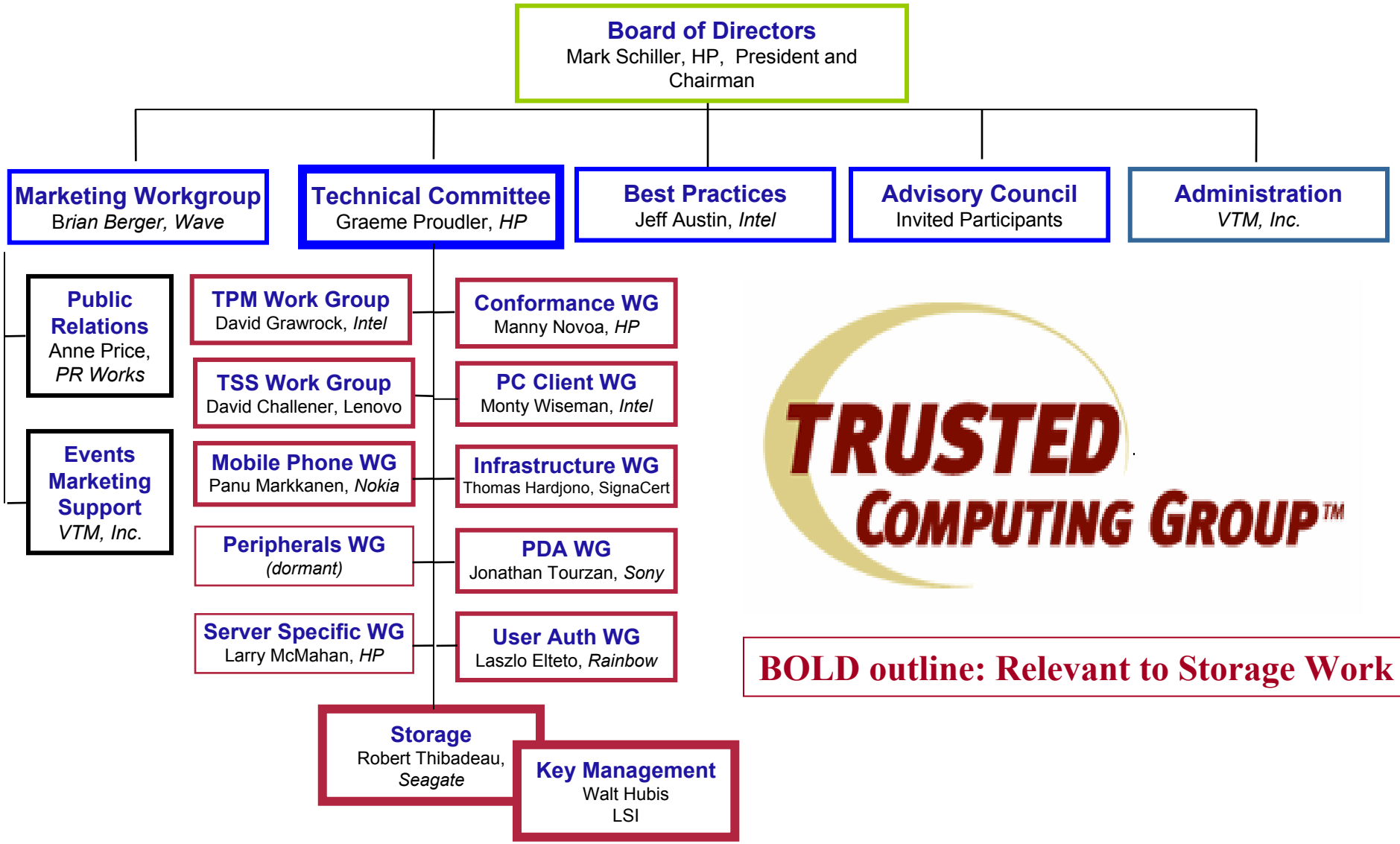
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BOLD outline: Relevant to Storage Work
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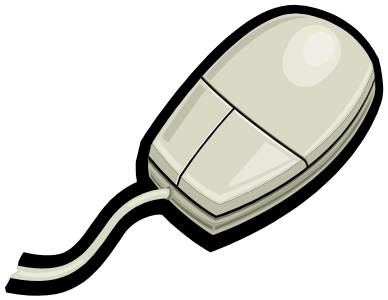
Extending Trust to Platform Peripherals

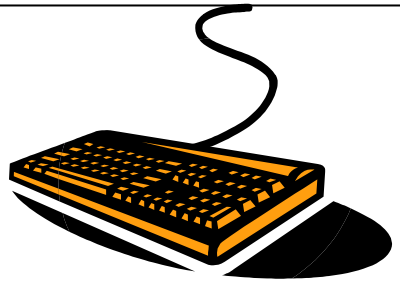


Ability to interact with the Platform

Authentication/Attestation

LOW HIGH

Capability Level



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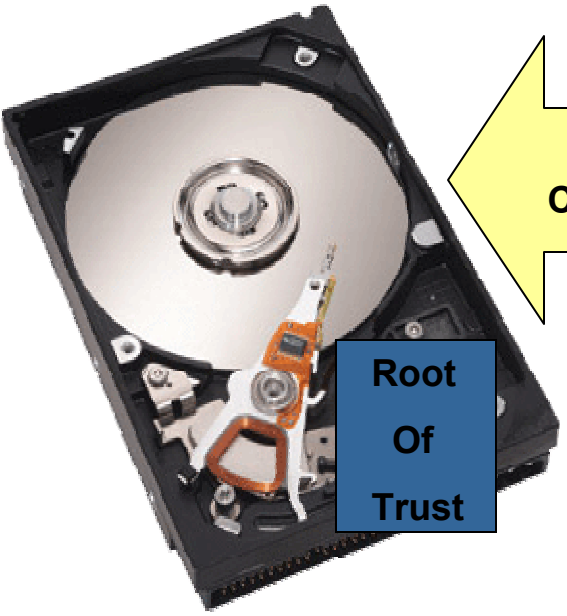
Trusted Peripheral with Trusted Platform

Trusted Peripheral



Secure
Communications

Trusted Platform

TPM

Life Cycle: Manufacture, Own, Enroll, PowerUp, Connect, Use, …

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Joint Work with ISO T10 (SCSI) and T13 (ATA)

TRUSTED SEND/IN

(Protocol ID = xxxx …..)

TRUSTED RECEIVE/OUT

T10/T13 defined the "**container commands**"

TCG/Storage defining the "**TCG payload**"

Protocol IDs assigned to TCG, T10/T13, or reserved

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TCG Storage WG Specification

SPs (Security Partitions/Providers)

- Logical Groupings of Features
- SP = Tables + Methods + Access Controls

Tables

- Like “registers”, primitive storage and control

Methods

- Get, Set – Commands kept simple with many possible functions

Access Control over Methods on Tables

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TCG Storage Work Group Use Cases

- **Published Storage WG White Paper and FAQ**
- **Illustrative Subset of Total Storage Device Use Cases**
- **Specification "Solving" Use Cases Expected 1Q/2007**

- **Enrollment and Connection:** trusted relationship – Storage Device and host
- **Protected Storage:** for storing sensitive data
- **Locking and Encryption:** mating SD and host; encrypting stored data
- **Logging:** for forensic purposes
- **Cryptographic Services:** supporting a variety of security services
- **Authorizing Storage Device Feature Sets to Hosts:** trusted/exclusive use
- **Secure Download of Firmware:** trusting firmware upgrades

** See https://www.trustedcomputinggroup.org/home/ for Use Case paper and FAQ

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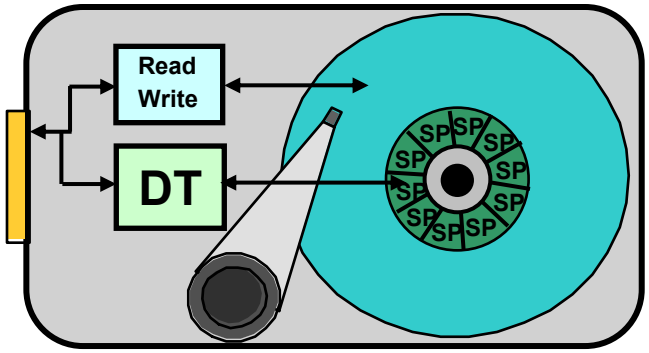
TCG Security Functions

3 Advantages in HDD's

- Arbitrarily large secrets storage
- Complete CPU for crypto operations
- Custom ASIC logic for high speed



Components:

Secret storage (SP's, or Security Providers)

- Inaccessible to standard Read/Write
- Multiple, separate spaces, each hidden from each other
- Impervious to reformat, OS load, virus attack

Operations (Methods)

- Create, manage, deactivate SP's
- Create, store, retrieve information in SP's
- Perform cryptographic operations – encrypt, decrypt, sign, hash, etc
- Provide services: logging, secure clock, RNG
- All with access control – permiting only authorized operations

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Applying TCG Protocol - Momentus FDE*

Purposes

- Protect data from exposure due to equipment loss,
- Enable instant, cryptographic erase of drive

TCG Security services provide key management interface

- Key and passwords cryptographically protected on media
- None accessible using ATA READ/WRITE commands
- Strong TCG defined access control governs access to passwords

Closed, permanent encryption device

- Encryption key generated in drive during manufacturing
- Encryption key never leaves drive
- Encryption cannot be turned off

*FDE = Full Disk Encryption

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THANK YOU!

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