Home Engine

LocalInvalAck
icount--

icount==0
MissWritableReply
or
UpgradeReply

LocalUpgrade
LocalInvalReq
icount = #inv

LocalWrite
LocalInvalReq
icount = #inv

WritebackReq
MissReply

TIS

ReadReq
ReadAck

DowngradeUpdateAck
ReadAck

DowngradeAck
ReadAck

ReadReq
CpuDowngrade

LIS

S

FlushReq
FlushAck

FlushReq
MissReply

RecallReadAck
MissReply

WritebackReq
(w/ SprShrOpt)
WritebackAck

UpgradeReq
CpuInvalidate

WriteReq
CpuInvalidate

I

WriteReq
RemoteInvalReq
CpuInvalidate

UpgradeReq
not from sharer
RemoteInvalReq
CpuInvalidate

UpgradeReq
from sharer
RemoteInvalReq
CpuInvalidate

LIM

WritebackReq
(wo/ SprShrOpt)
WritebackAck

InvUpdateAck
WriteAck
InvAck
WriteAck

LSM

InvUpdateAck
WriteAck
InvAck
WriteAck

LSM

RecallWriteAck
MissWritableReply

WritebackReq
MissWritableReply

FlushReq
MissWritableReply

M

InvAck
UpgradeAck

InvUpdateAck
UpgradeAck

ReadReq
ForwardedReadReq

TMS

FlushReq
WritebackStaleReadAck

WritebackReq
WritebackStaleReadAck

ForwardedReadAck

LocalWrite
RecallWriteReq

WritebackReq
from old owner
WritebackStaleWriteAck

ForwardedWriteAck

FlushReq
from old owner
WritebackStaleReadAck

UpgReq
ForwardedWriteReq

WriteReq
ForwardedWriteReq

LocalRead
RecallReadReq

TML

TMI

TMM

WritebackReq from new owner
Refuse
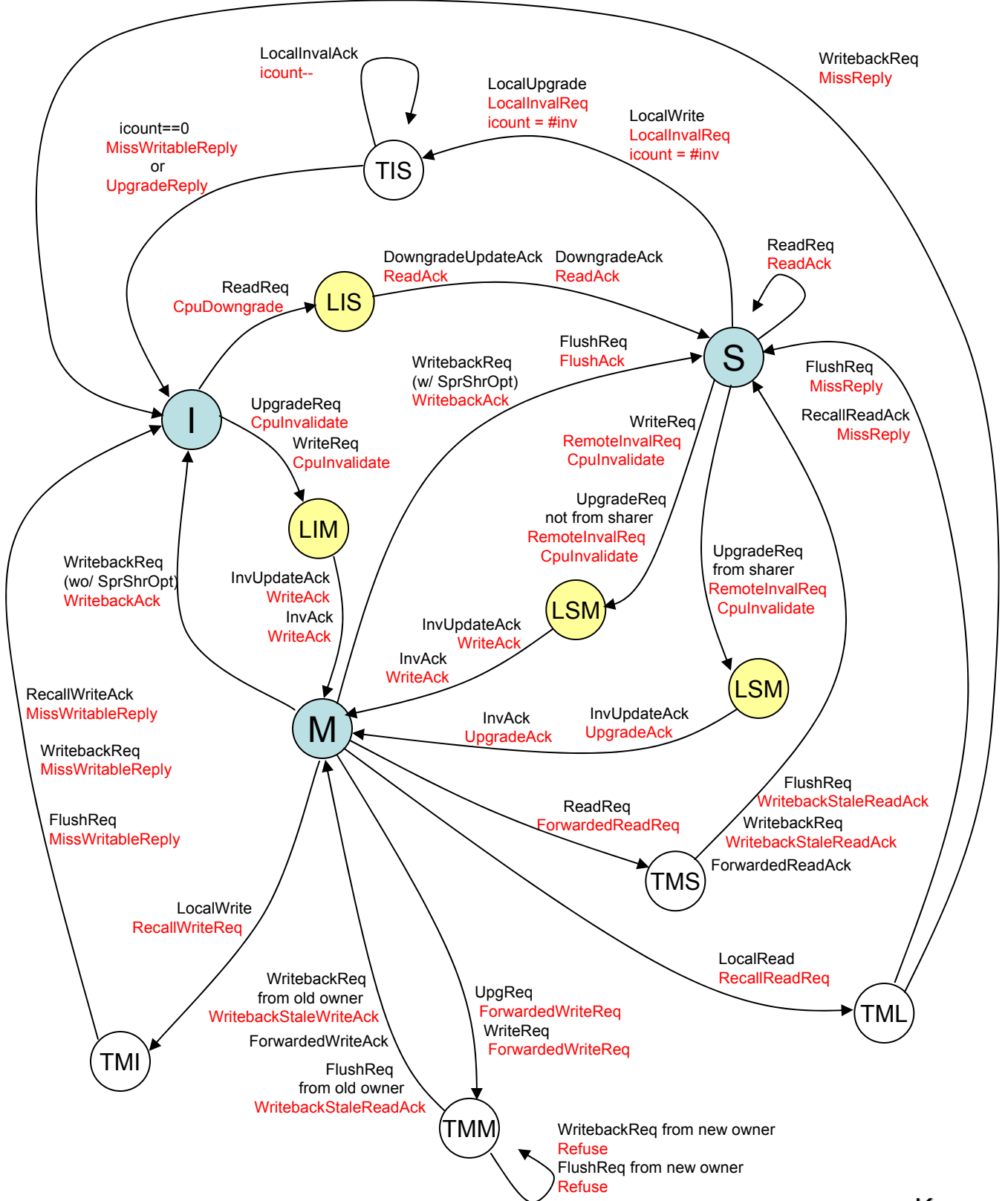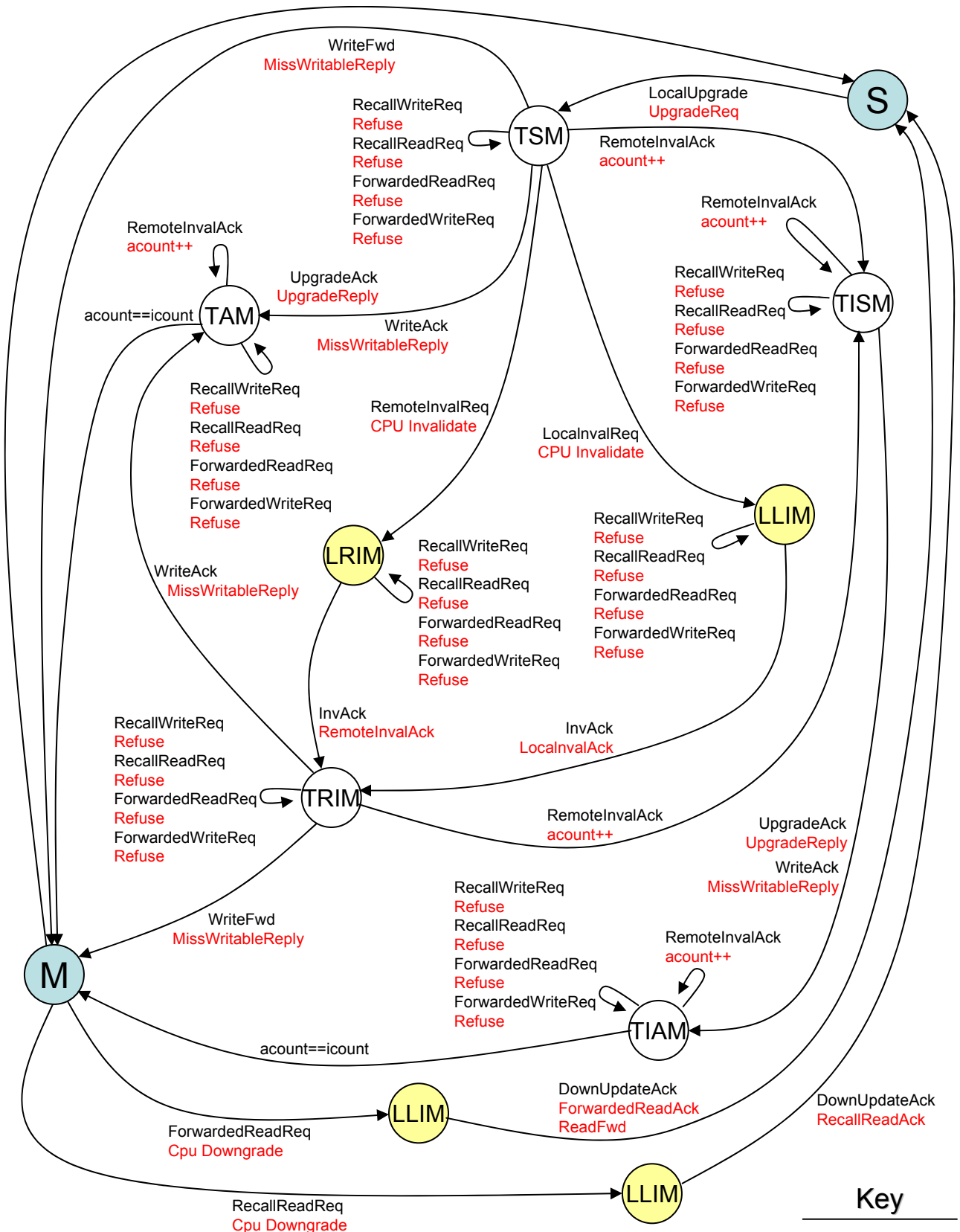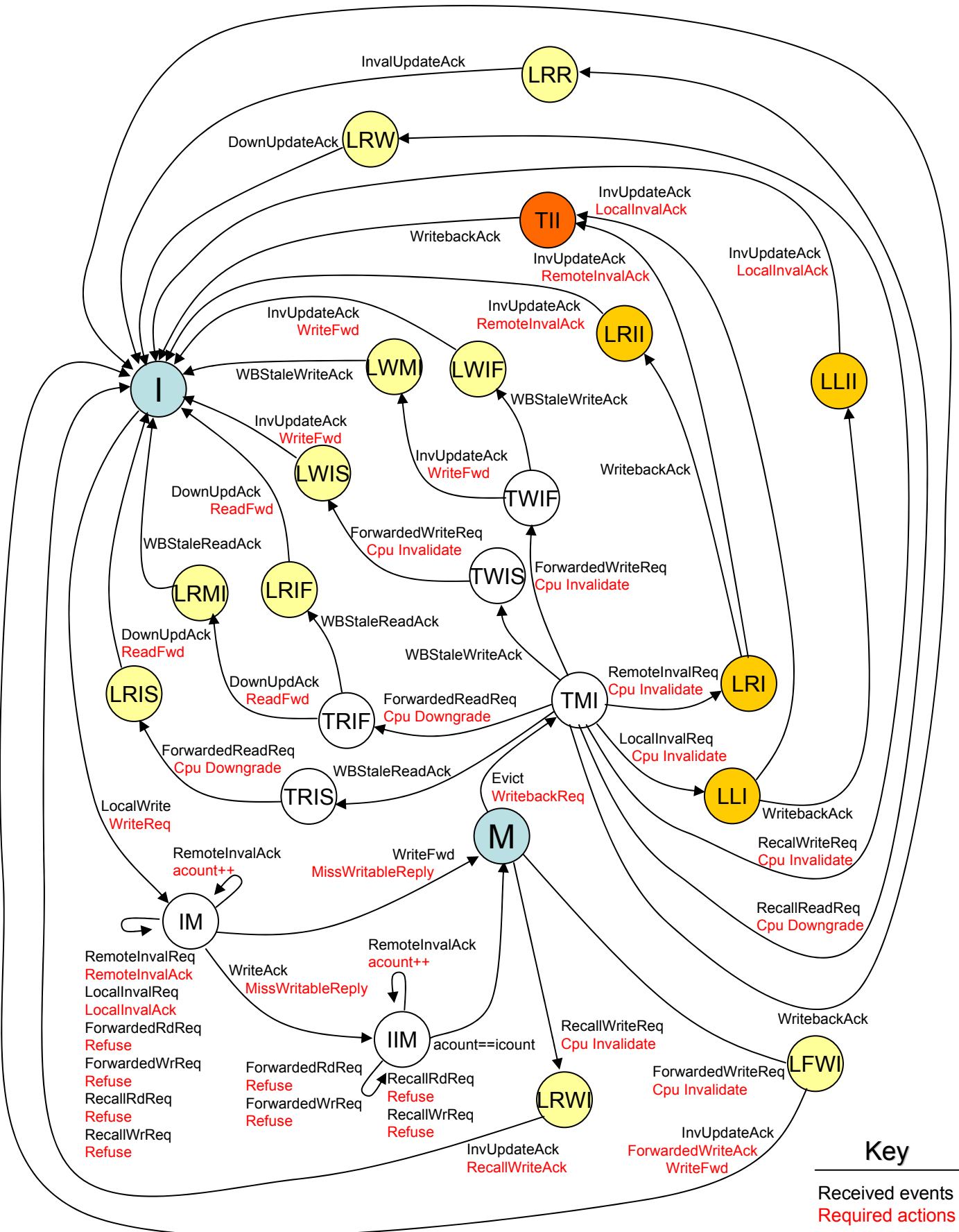FlushReq from new owner
Refuse

Remote Engine – I/S
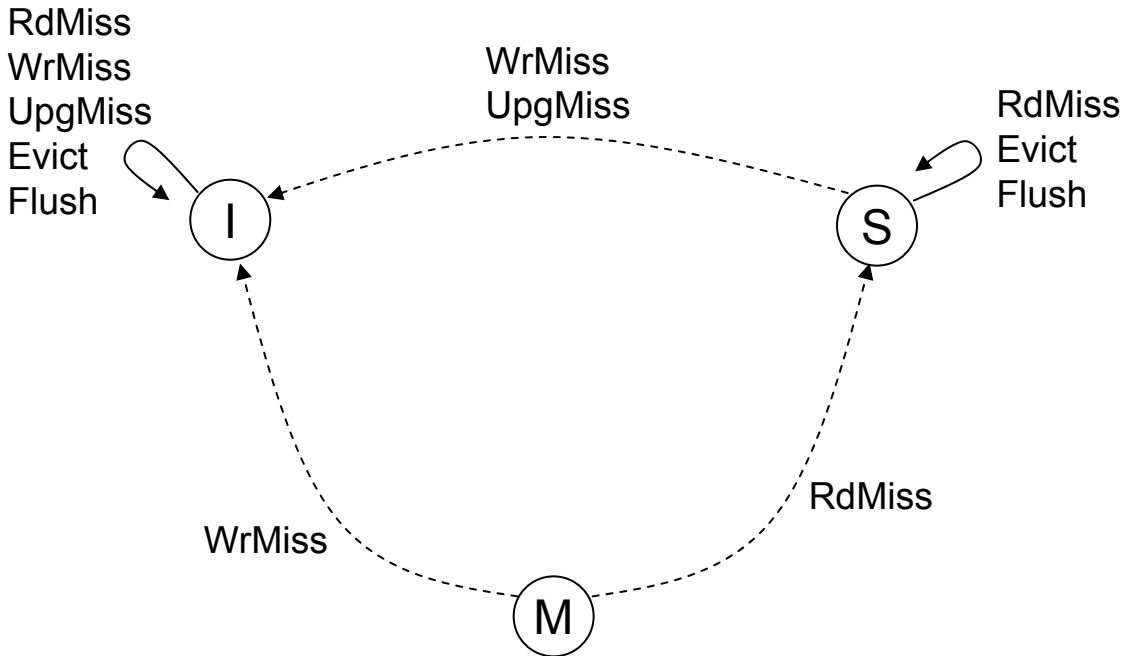

Key

Received events
Required actions

Remote Engine – M/S

Key

Received events
Required actions

Remote Engine – I/M

Remote Engine – Flush (not completed)

Key

Received events
Required actions

Local Engine

RdMiss
WrMiss
UpgMiss
Evict
Flush

WrMiss
UpgMiss

RdMiss
Evict
Flush

I **S**

M

WrMiss

RdMiss

- Dotted lines indicate a transition through the home engine
- Nodes are directory states, not cache line states